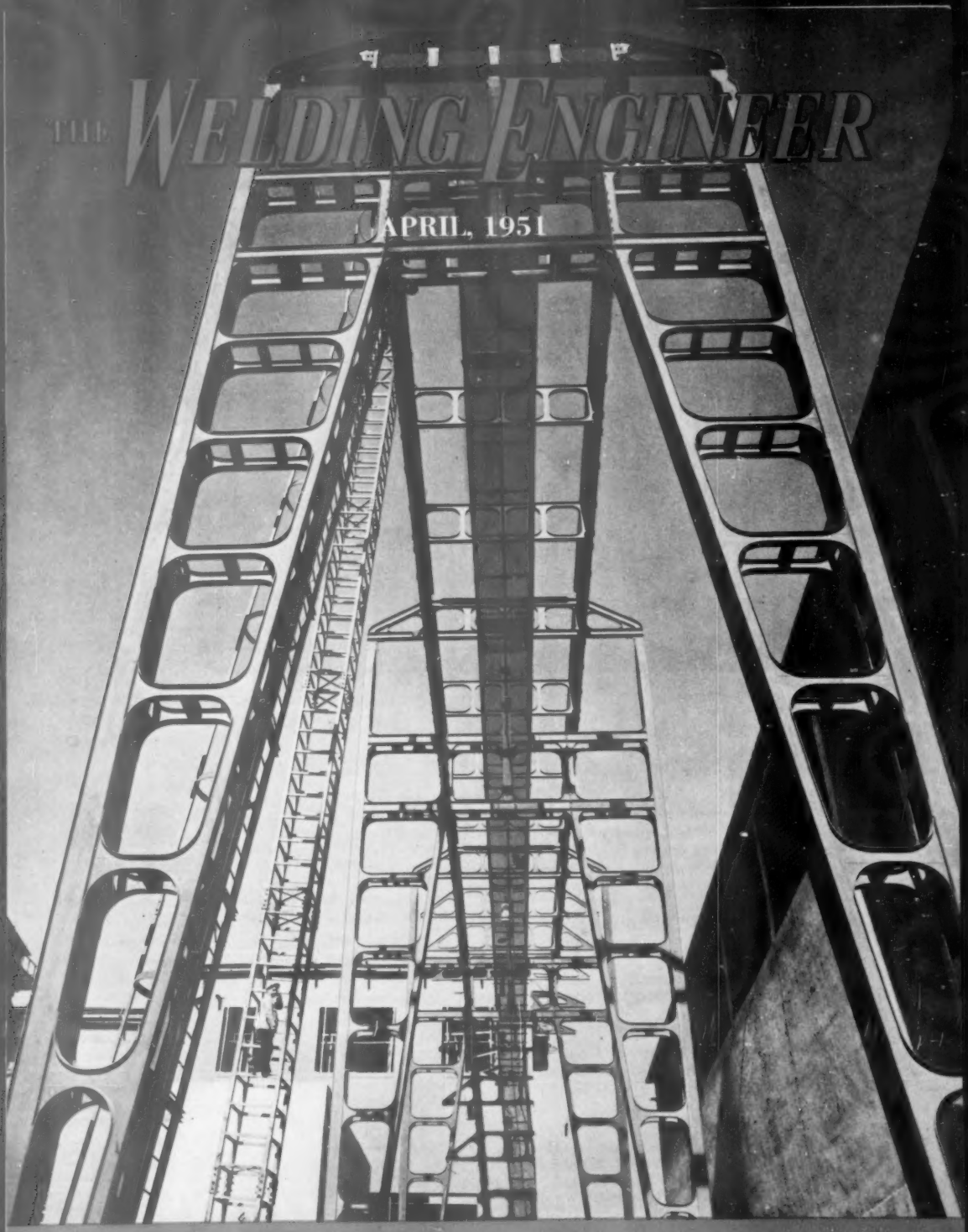


THE WELDING ENGINEER

APRIL, 1951

IN THIS ISSUE: News from Washington . . . page 5

A McGRAW-HILL PUBLICATION

MODEL
AA•1

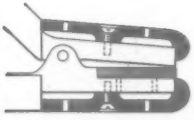
electrodes through 1/4", 300 amps.
Price $6.00, lower in quantity

MODEL
AA•3

electrodes through 3/8", 500 amps.
Price $7.50, lower in quantity

MODEL
AA•3S

electrodes through 3/8", 500 amps.
with larger handle for greater ventilation
Price $8.00, lower in quantity



Something new has been added to these three Jackson Electrode Holders.

Not only are their tongs made of a heat treated superior 98% copper alloy—Not only has it been proven in tests that these Jacksons have extra *tensile strength*, extra *hardness*, and extra *conductivity* over other makes of copper alloy holders—*but* . . .

The latest "EXTRA" is in the lower jaws that are now made *replaceable*, without having to replace the entire lower tong.

For no matter how strong we make them, it's the lower jaws that have the grooves to grip the rods, and tend to wear out faster than the rest of the holder.

It's these *replaceable jaws* that will make these Jackson Double-A models your preference for long, economical performance.

Call your Jackson distributor for prompt delivery of these and many other Jackson Electrode Holders, Ground Clamps and Cable Fittings, Eyeshields, Safety Goggles.

Standard Models Continued

Long-time favorites, Jackson insulated copper alloy holders with *one-piece tongs*, will, of course, be continued. They are of the same capacity as the double-A holders of like numbers, above.

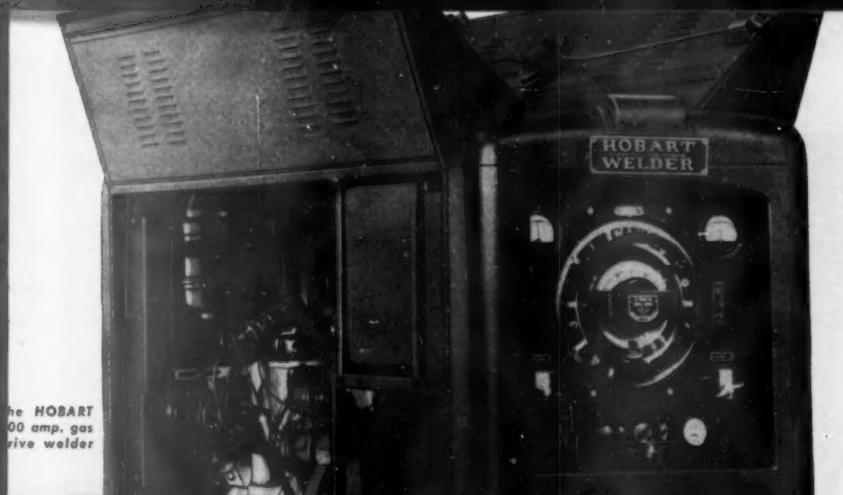
Cables may be soldered, brazed, or clamped in place mechanically.

Model A-1	Model A-3	Model A-3S
$5.50	$7.00	$7.50

All prices lower in quantity.

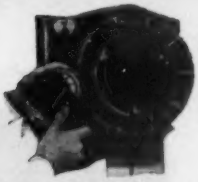
JACKSON
PRODUCTS
WARREN • MICHIGAN

WORLD'S LARGEST MANUFACTURER OF ELECTRODE HOLDERS



he HOBART
00 amp. gas
rive welder

Here's how
HOBART Simplified Welding



REMOTE CONTROL lets operator make correct heat adjustments right at his work—no returning to machine—no lost time.

POLARITY CONTROL switch is instant, positive—makes it easy to change from one type of electrode to another.

COOL RUNNING because air passes through, as well as around, the armature parts. End-to-center ventilation changes air twice as often.

CUTS COSTS for you...
in the plant...in the field...on the road...*anywhere!*

Stationary Gas Drive Welder can be hauled...

...or Portable can be towed right to the job.

It stands to reason that if you put more into a welder . . . you'll get more out of it.

Hobart has done just this. They've put in "more" in the way of engineering, material, and convenience features . . . so you can take out "more" in performance, the real key to lower costs. That's why, dollar for dollar, you just can't beat a Hobart Welder.

Every Hobart has plenty of extra reserve capacity, dependability, and long life. Wherever you take them and however you treat them, they've got what it takes to stand the gaff and still give top performance.

Hobart's exclusive Multi-Range Dual Control gives you a selection of 1,000 volt-amp combinations. Remote Control, at no extra cost, lets you make heat adjustments right at your work—no returning to the machine.

If you really want to cut your costs, investigate Hobart Welders. Just check the coupon for full information.

HOBART BROTHERS CO., BOX U-41, TROY, OHIO

"One of the world's largest builders of arc welders

HOBART WELDERS

The HOBART 300 amp. electric drive welder

The HOBART School offers Complete Welding Training

This modern, non-profit school is dedicated to the advancement of the welding industry. Training is thorough and complete . . . equipment is the latest and best . . . instructors are experienced in both practical work and teaching. Check coupon for complete information.

HOBART BROTHERS COMPANY, BOX U-41, TROY, OHIO

"Procedure and Practice." A complete welding text. ☐ 544 pages. $3.

Without obligation, please send me complete information on the items checked below.

☐ _____amp. Gas Drive ☐ _____amp. Electric Drive ☐ Electrodes ☐ Accessories ☐ Welding School

NAME _____ POSITION _____

FIRM _____

ADDRESS _____ ☐ home ☐ business

CITY _____ STATE _____

TITANIUM WELDING

Top to bottom: parent metal; weld zone after welding; weld zone after heating 10 minutes at 1650°F. and furnace cooling; and weld zone after heat treatment for 20 minutes at 1650-1700°F. and furnace cooling.

Experimental weld on ½-inch round rod.

Federal Welders of Standard Design Used With Exceptional Success...

Commercially pure titanium is being flash butt welded in production quantities by the American Welding & Mfg. Co., using a standard 750 kva Federal Welder.

Titanium rings for jet aircraft engines are formed from 1x1¼-inch bar stock, then welded, using a burnoff of about ¾-inch and an upset of ¾-inch in a typical 15-second cycle.

While experimenting with welding ½-inch round rods of titanium, American Welding found the standard Federal Welder rapidly produced a weld that held under a breakdown tensile of 115,000 psi, the fracture occurring in the parent metal. All ½" test welds were proof loaded at 22,000 pds or 105,000 psi with no failures.

Many such reports of the extreme flexibility and rugged construction of hundreds of Federal Welders working in the first line of defense is the reason why today, more than ever before—*FEDERAL IS FIRST IN RESISTANCE WELDING.*

Federal® WELDERS

Warco® PRESSES

THE FEDERAL MACHINE AND WELDER COMPANY

WARREN, OHIO

THE WELDING ENGINEER

A McGRAW-HILL PUBLICATION

VOLUME 36 NUMBER 4

A. M. Morris, *Publisher*
T. B. Jefferson, *Editor*
Clyde B. Clason, *Managing Editor*
William C. Henzlik, *Associate Editor*
Jack I. Medoff, *Associate Editor*
George B. Bryant, Jr., *Chief Washington Bureau*
Russell F. Anderson, *Editor World News*

C. H. Clarke
Eastern Manager, New York, Tel. LOngacre 4-3000

E. J. McOsker
Central Manager, Hanna Bldg., Cleveland
Tel. Superior 1-7000

Thomas H. Barry
Western Manager, Chicago, Tel. WHitehall 4-7900

Carl W. Dysinger
1111 *Wilshire Boulevard, Los Angeles, Calif.*
Tel. MAdison 6-4323

John W. Otterson
68 *Post Street, San Francisco, Calif.*
Tel. Douglas 2-4600

J. H. Allen, Jr.
First National Bank Bldg., Dallas, Tex.
Tel. Prospect 7-5064

John Doyle
Assistant to Manager

THE WELDING ENGINEER • APRIL • Vol. 36—No. 4

(with which is combined The Acetylene Journal)
Member ABC and ABP

Published monthly, with an additional directory number in June, by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Publication Office: 871 North Franklin St., Chicago 10.

Executive and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

Editorial Offices: 520 No. Michigan Ave., Chicago 11, Ill.

Subscriptions: Address correspondence to The Welding Engineer—Subscription Service, 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address. Please indicate position and company connection on all subscription orders.

Single copies 35c. Subscription rates—United States and possessions $3 a year; $4 for two years; $5 for three years. Canada $5 a year; $8 for two years; $10 for three years. Pan-American countries $10 a year; $16 for two years; $20 for three years. All other countries $15 a year; $25 for two years; $30 for three years. Entered as second class matter Aug. 23, 1948, at the Post Office at Chicago, Ill., under Act of Mar. 3, 1879. Printed in U. S. A.

Copyright 1951 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved.

THE WELDING ENGINEER is indexed regularly by Engineering Index, Inc.

APRIL, 1951

COVER: *Aerial rail conveyor constructed of welded Vierendeel trusses —see page 22. It transports ore and lime at the Electric Steel Works of the Ilva Corp., near Naples, Italy.*

NEWS FROM WASHINGTON 5

MAINTENANCE

Welding at the St. George 17
JACK MEDOFF

PRODUCTION

Spot Brazing Chair Frames 21

How We Repair Steel Castings 26
ALFRED E. BLAKE, JR.

CONSTRUCTION

In Italy It's Vierendeel 22
A. BOZZARELLI

Stainless-Steel Towers for Scottish Oil Refinery 34
E. N. ZIMMERMAN

FABRICATION

Cosmotron Coil Silver Brazed 25
E. W. MOLES

Mechanization Cuts Costs 36
H. JACKSON

EDUCATION

Preparing Men for a Welding Career 30
T. B. JEFFERSON

RESEARCH

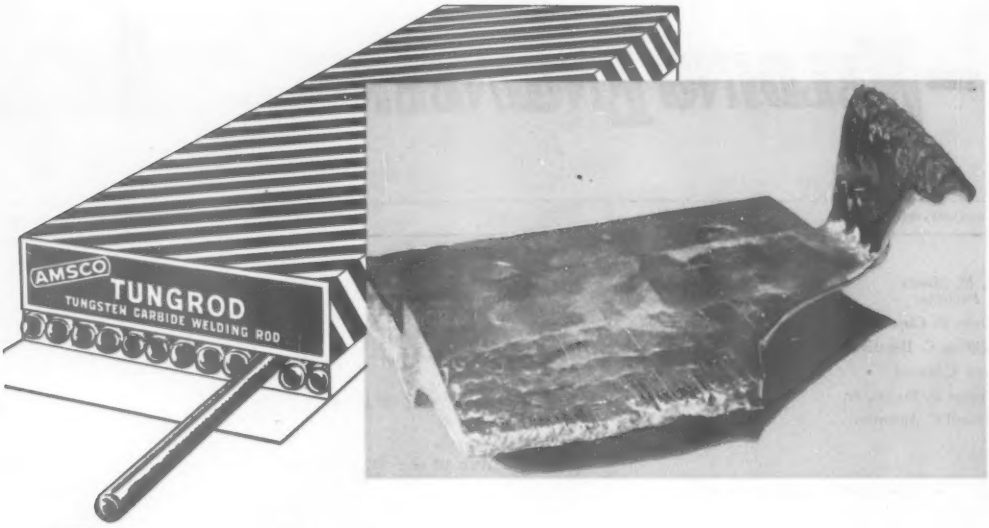
Stainless Welded without Columbium 40
RICHARD K. LEE

SELLING

Be a Better Listener 42
RICHARD C. BORDEN

DEPARTMENTS

Editorial: Men—Our Secret Weapon 15
New Products for Welding 44
Engineering Data Sheet No. 127 49
For Your Technical Library 51
On the Job 54
News 56
About People 80
Thirty Years Ago 83
From the Patent Office 84
Searchlight Section 95
Where to Buy 95
Advertisers in This Issue 96



Saved HUNDREDS OF DOLLARS PER MONTH IN PULVERIZING!

An example of how the AMSCO Hardfacing System can help you fight wear profitably

Here's why the AMSCO HARDFACING SYSTEM can save you money

Hardfacing recommendations are as sound as the manufacturer who makes them. For a half-century, Amsco has specialized in fighting the high cost of wear—first with manganese steel and later with another big weapon . . . AMSCO Hardfacing Rods and Electrodes.

The result is the AMSCO Hardfacing System . . . where a wide range of Amsco Rods are selected for use according to a systematic appraisal of the equipment part and wear factors involved.

Whether your particular problem is one of wear caused by impact, abrasion, heat, corrosion—alone or in combination . . .

Amsco has both the research facilities and the years of on-the-job experience necessary to help you make important reductions in your operating costs.

A large Pennsylvania brick company was faced with this problem: their pulverizer plows wore out every two weeks due to extreme abrasion of clay with a high silica content. An expensive period of down-time and replacement labor resulted.

In trying to stop this high replacement cost, a test was made. Each plow was hardfaced with AMSCO Tungrod—specially developed by Amsco research for high resistance to abrasive wear.

Result? The plows hardfaced with AMSCO Tungrod lasted 4 times as long . . . 3 out of every four replacement jobs were eliminated! The saving amounted to several hundred dollars *each month*!

AMSCO Tungrod permits big savings—through longer service and fewer replacements—on many other applications. If you have an equipment part used in cutting or pulverizing non-metallic materials, the possible savings—*to you*—are too big to be overlooked!

Write today for illustrated hardfacing catalog — and nearest distributor's name.

AMSCO®
WELDING PRODUCTS

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
382 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

NEWS FROM WASHINGTON

Spoor Now Chief, NPA Welding Section

As announced last month, Dale D. Spoor, manager of the equipment sales department of Air Reduction Sales Co., has been granted leave of absence to serve with the National Production Authority in Washington, D. C. As chief of the Welding Section of the Machinery Division of the National Production Authority, Mr. Spoor will head the group to which all manufacturers of welding equipment, apparatus, supplies, electrodes and welding rod will look for their requirements of critical materials.

The NPA, established to handle the allocation of critical materials, has called upon American industry to furnish men with a thorough knowledge of their industry and its needs to aid in the defense program.

Mr. Spoor has an excellent background for his new position. He received his degree in Engineering Administration from Massachusetts Institute of Technology in 1922. His career in the welding industry began in 1928, with the construction of an oxygen plant in California. He has served in various capacities in the Airco organization, including an assignment in Washington. In 1941 he became manager of the St. Louis district and in 1948 he was appointed manager of the equipment sales department (which he organized), combining the former oxyacetylene and arc-welding equipment and supplies departments.

The National Production Authority was established September 11, 1950, within the Department of Commerce, under the Defense Production Act of 1950. It was given authorization to establish priorities and to allocate materials and facilities.

The NPA operates to insure that military needs for the rearmament program are met as and when they develop. It must also prevent, as far as possible, disruption in the civilian economy.

DALE D. SPOOR now heads the group of NPA to which manufacturers of welding supplies will look for their materials.

Here's What You Do to Get a DO Rating

NPA has established, by regulation, a broad system of priorities to assure the right-of-way of defense orders (DO). The "DO" rating is a symbol denoting a single-band priority, meaning that it carries the same priority regardless of the number assigned with it. The numbers assigned refer only to the particular programs involved; they do not represent any difference in priority. DO orders must be accepted as they are received.

The most useful recent regulation enacted by the NPA to aid the welding industry – manufacturers, users, distributors and job shops – to secure needed maintenance, repair and operating supplies is known as Regulation 4—the MRO order. This carries a priority of DO-97; it has the same priority as any DO rating.

Here's how it works:

As a user of welding equipment, you may now apply a DO rating for maintenance, repair and operating supplies without going to the National Production Authority. The priority rating is DO-97.

The regulation acts like a chain reaction. You obtain critical supplies more easily. Your supplier (the distributor) replenishes his stocks more quickly. His supplier (the manufacturer) secures his raw materials faster. But you must use the DO-97 to make the chain reaction work.

How You Find Your MRO Quota

If your quarterly MRO expenditures will not exceed $1,000, all you have to do is keep a purchase record of everything you buy for maintenance, repair, and operating supplies, even if you do use DO-97 to get them.

To find your quarterly quota, you simply add your 1950 MRO expenditures and divide the sum by four. This is the standard quota. If you operate seasonally, you figure just what you spent for MRO each quarter, and use the four different totals as quotas for the corresponding quarters this year.

If your MRO expenses are more than $1,000 per quarter, you have to notify NPA in writing of your quota, the base period used, the method by which you arrived at the quota, and any corrections made for seasonal or other factors. This must be done within 30 days after your first use of the rating.

Of course, if you can get your MRO supplies without using DO-97, you should do so. But once you use the rating, you must limit your purchases in accordance with the regulations.

The official definition of MRO doesn't include improvements, or the replacement of sound, workable material with new or different machines. The order does, however, provide for the use of DO-97 for "minor items of capital equipment," where the total cost of the complete unit does not run to more than $750. This means that you can use a DO-97 to purchase a welding machine if its cost is under that limit (as, for example, a farm weld-

 (Continued from page 5)

er, etc.). However, such a purchase would be charged against your MRO quota.

Welding supply distributors may extend all DO-97 ratings they receive. NPA is specific on this point: "This preference rating may be extended by the person receiving the rated order in the same way as any other DO rating may be extended."

The only restriction that NPA makes is that Regulation 4 cannot be used for household or personal use. This means that home workshops and hobby shops are out so far as this priority is concerned.

It is expected that MRO will be administered very liberally. If the order works hardships, application can be made to NPA for a hardship ruling, and it will receive sympathetic attention.

A wise precaution—for user, distributor and manufacturer—is to keep records on all materials, and to preserve them for at least two years. These should show receipts, deliveries, inventories and end use.

Here is a case in point for utilizing DO-97 wherever possible, to assure future renewal of supplies and inventory: The newly-formed Industrial Supply Distributors Industry Advisory Committee has asked NPA to issue an order enabling it to replace supplies depleted by filling non-defense orders before the MRO order was issued. Since distributors neither produced nor consumed the products sold, they could not originate priority-rated (DO) orders with which to replenish stocks sold to customers not using a priority.

The MRO Regulation isn't likely to be changed with the advent of the Controlled Materials Plan, scheduled to start on July 1. MRO is, in fact, one of the essential controls in any materials control set-up, as it was in the allocation plan during World War II.

Long range view by insiders is that controls are here to stay, even if peace is established in Korea, and that the real impact of mobilization won't be felt until the fourth quarter of 1951, extending well into 1953.

How Much Can You Use of Copper, Steel, etc.

THE SITUATION for steel, copper and aluminum for the second quarter of 1951 shapes up as follows:

STEEL: Manufacturers of consumer durable goods are restricted to 80% as much iron and steel in making these products as they used in the average quarter of the first six months of 1950.

COPPER: Fabricators will have 75% of their base period rate of consumption—a drop of 5% from the 80% in March.

ALUMINUM: Fabricators will still be permitted to use 65% of their base period rate of consumption.

More steel for small business is expected after April 1, when auto and other civilian hard goods manufacturers will be required to cut steel back to 20% below their usage level during the first half of 1950. Defense production is not expected to absorb the whole saving; some will undoubtedly be "redistributed" to small users as MRO supplies.

Most critical shortage now is in tungsten—which is bad news for inert-arc welding jobs requiring tungsten electrodes unless you have a priority rating.

Machine Tool Makers Offered Priority Aid

PRIORITIES assistance to obtain machine tools needed for the expansion of facilities is now available to machine tool manufacturers. Application should be made directly to the Machinery Division of NPA, which is calling for rapid expansion of the industry.

Applicants for priorities should give detailed information on the tools needed, explain why they are needed and show that alternate facilities are not available. They must also show that the needed tools cannot be obtained without a priority rating.

Applications for DO-98 ratings have been received by the Munitions Board and local military contracting officers from many machine tool manufacturers. However, only machine tools actually needed by contractors and sub-contractors working on DO-rated orders are eligible for DO-98 ratings.

Bring Liberty Ships Out of Mothballs

NOW THAT no more Victory ships remain to be reactivated, the Maritime Administration is reaching down to see what remains at the bottom of the barrel. Most recently, it has come up with 41 of the older, slower Liberty ships, which have been ordered out of mothballs for service in carrying ECA cargo. Some $56-million has been allocated for putting the ships back into commission. Of this, $20-million is to be spent on drydock work, with the remainder for contract bid repairs on 29 of the 41 ships.

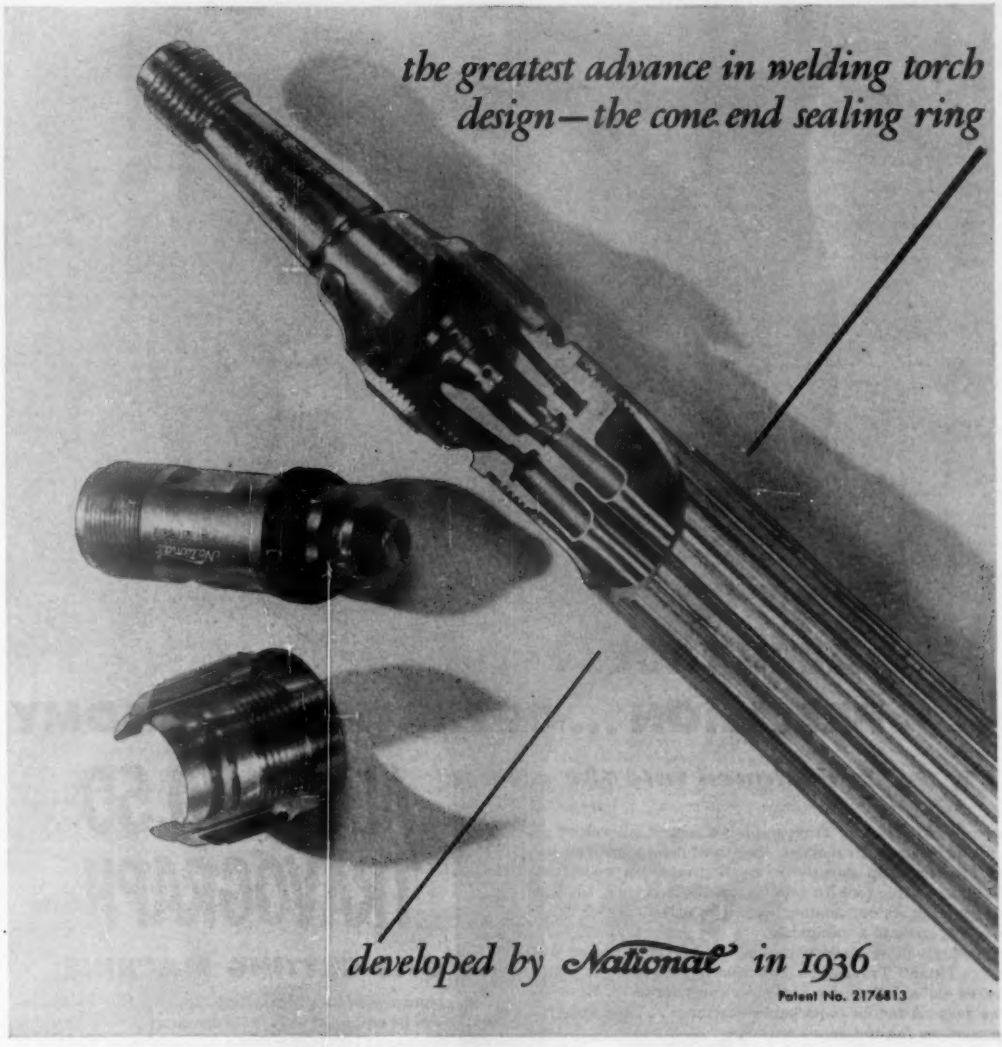
"Pool Orders" Set For Machine Tools

SCHEDULING, production and distribution of machine tools costing $500 and over—including welding machines—were, in effect, taken over by the government through the establishment of a system of "pool orders," and a method of distributing tools among manufacturers working on direct mobilization contracts.

Order M-40 establishes the "pool order" system. This enables the General Services Administration to place firm orders with machine tool manufacturers, who can then fit the machines into their production schedules without delay. NPA recommends to GSA the types and quantities of tools to be ordered.

Order M-41 regulates the delivery of the machines. Production is to be divided, with 70% available to the armed services, their prime contractors or their sub-contractors, and the remaining 30% to all other purchasers with rated or unrated orders.

With each "pool order" will be an authorization for the producer to apply a DO rating for needed materials.



The greatest advancement in welding torch design and construction was made when NATIONAL engineers developed and patented the better way of making an effective, leakproof, damage proof joint between mixer and welding torch head; between cutting attachment and torch butt.

These neoprene sealing rings have taken the trouble out of the welding torch—they eliminated the use of a wrench to keep a tight seat. No other seating arrangement has given so much satisfaction over so long a time period. IT'S THE SEALING RING WHICH SAVES YOU MONEY — WHICH MAKES YOUR WELDING TORCH AND CUTTING ATTACHMENT STAY ON THE JOB LONGER — AND IT IS A PATENTED FEATURE OF NATIONAL WELDING EQUIPMENT CO.

507

Made by National SINCE 1910 WELDING EQUIPMENT CO., San Francisco 5, California

AIRCO ACCURACY... PRECISION ... OPERATING ECONOMY

designed into the all new

AIRCO NO.50 TRAVOGRAPH

GAS CUTTING MACHINE

Airco's NEW No. 50 Travograph is a rugged, all-welded gas cutting machine. Its massive, long-lived design is engineered to give fingertip sensitivity to all production operations. Used as a basic tool for multi-torch shape cutting, squaring or beveling, its outstanding accuracy slashes reject loss and working costs to a minimum.

Today's most modern production tool, the rugged new Airco No. 50 Travograph precision-cuts steel—light plate, heavy slabs, billets, forgings—to close tolerances. Here are the reasons for its remarkable exactness . . . the "why" it guarantees faithful reproduction.

1. All-welded construction provides a combination of ruggedness, resistance to vibration, and precision operation.
2. Rigidity built into the torch-bearing pantograph arms enables the torch bar to support a uniform load of *500 lbs!*
3. Perfectly-balanced when properly set on 16′ rails.
4. Ball bearings in the hinge joints make it extremely smooth operating.

For greatest operating flexibility, the new No. 50 Travograph can be equipped with three distinctly different tracing devices—manual, magnetic, or the full-automatic "Electronic Bloodhound". The "Electronic Bloodhound" needs only an outline drawing or silhouette to cut the most intricate shapes smoothly, sharply, quickly . . . and with extreme accuracy.

If your production line requires quantity flame shaping operations . . . and if close precision cutting would lower your finish-machining costs . . . it will pay you to investigate Airco's new No. 50 Travograph. For complete information write your nearest Airco office for the new catalog just coming off the press.

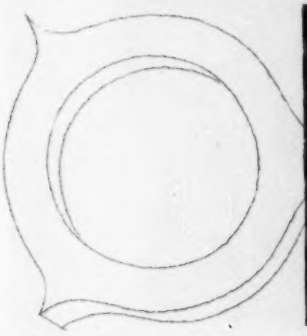
AIRCO

AIR REDUCTION

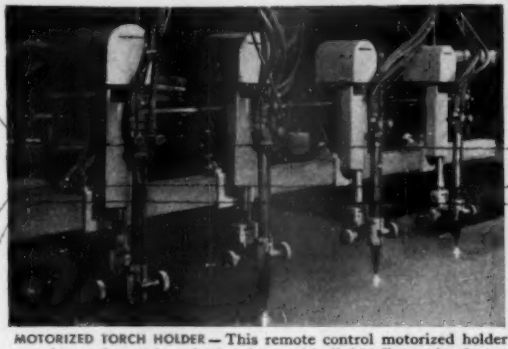
Offices in Principal Cities

AIR REDUCTION . . . PIONEER

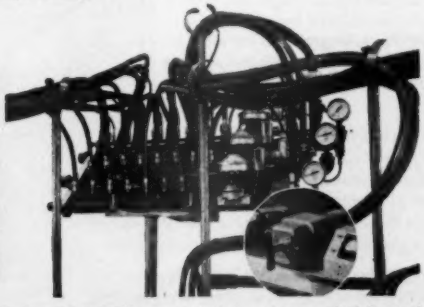
WIDE CUTTING RANGE — The No. 50 Travograph cuts circles up to 144" and any shape that does not exceed 92" x 144" on one side. Carriage speeds range from 2" to 35" per minute on the low side; 10" to 168" on the high side, permitting a wide cutting range and allowing high speed positioning over the work.



SELF-SUPPORTED MANIFOLD — This individual pantograph arm supports the entire weight of the gas distribution equipment, and is guided by the tracer bar, so that the manifold-torch relationship remains constant. The useful load capacity of the tracer bar is greatly increased because it carries no gas equipment except torches.



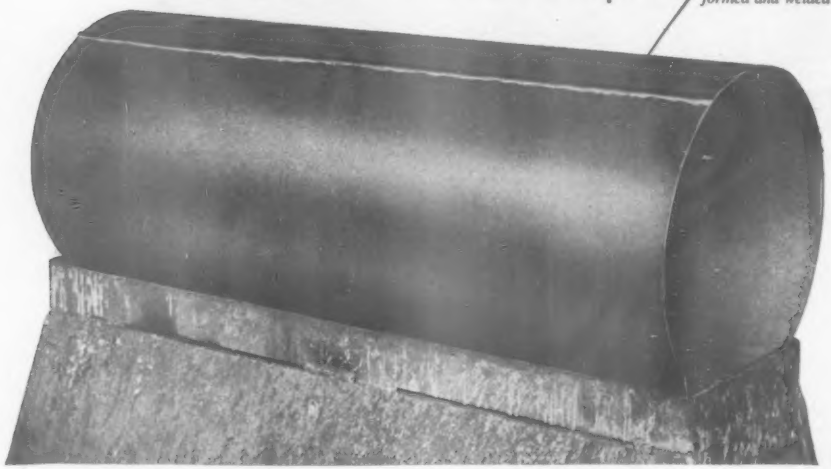
MOTORIZED TORCH HOLDER — This remote control motorized holder permits torches to be raised or lowered individually or simultaneously. Fingertip regulation by the operator allows close control of the space between the cutting tip and the material. Torches may be raised or lowered when bevel cutting without upsetting the bevel angle setting.



GAS DISTRIBUTION SYSTEM — A twist of the selector switch located on the remote control box at the "operator's station" gives complete control of preheating gases and cutting oxygen. This operates one to eight torches, and assures a properly adjusted flame for repetitive cutting operations. This remote control is made possible by solenoid operated valves located on the manifold.

DESIGNERS OF FLAME CUTTING MACHINES FOR EVERY PURPOSE

We laid a bronze welding rod in the Customer's lap



Cylinder shell formed and welded.

Cylinder welded and finished, ready for shipment.

The problem was to braze the 30 in. longitudinal lap seam in these steel gas cylinders produced by the Steel Cooperage Company Division of Industrial Stamping & Manufacturing Company of Detroit.

An ANACONDA Technical Department welding specialist suggested preplacing a 30 in. length of ANACONDA Deoxidized Copper-939 Welding Rod on the lap seam and passing the shell between gas-fired burners. The filler metal, of a diameter to supply just the right amount of metal, melts and is drawn into the seam by capillary action. Production of several hundred units per eight-hour day is constantly maintained.

Simple. Economical. Profitable. Other production welding jobs can easily be handled similarly with good results. ANACONDA Welding Rod specialists are ready to help you on such jobs—or any other welding problems. Get in touch with them now. ANACONDA Welding Rods are sold by distributors throughout the United States.
The American Brass Company, Waterbury 20, Connecticut.
In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

50194

You can depend on

ANACONDA®

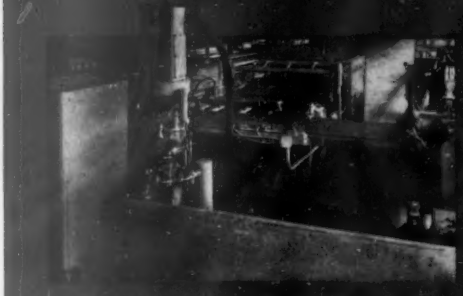
bronze welding rods

Making steel pipe at Central Valley Pipe Co. Two opposed Vacu-Blast guns, one inside and one outside of formed pipe section. Insert: close up of Vacu-Blast gun midway in pipe section.

Section through typical Vacu-Blast gun showing path of abrasive from blast nozzle to the work and return through vacuum system.

Amazing New VACU-BLASTER

"SAVES $1,000 A MONTH IN EDGE-CLEANING STEEL PLATE PRIOR TO WELDING"



Vacu-blast cleaning narrow strip on edge of pre-lithographed steel sheet for leading steel drum manufacturer. What other method could do this job.

DEMONSTRATION CAN BE ARRANGED!

By using Vacu-Blaster to clean a welding strip inside, outside and edge of steel plate, Central Valley Pipe Co. saves $1,000 a month over former method; produces steel pipe fast with no leakers using automatic submerged arc welding.

Such savings are common with revolutionary new Vacu-Blaster—the only blast cleaner with a vacuum pick-up.

Blast can be precisely controlled to clean narrow strip on edges of steel plate or may be used to clean whole surfaces of metal, concrete, wood or brick. There's no flying dust or dirt to bother operator, damage machinery or contaminate product.

Vacu-Blaster reclaims and reuses abrasive, eliminates clean up time. It's portable—can be moved to any job—or installed right in your production line. Makes water tight welded seams with a single pass—ideal for pipe, tank, drum or pail manufacturing, and for fabricating steel structures.

Hundreds of satisfied users. Mail coupon for details about the only blast cleaner with a vacuum pick-up.

Write for FREE BOOKLET!

Vacu-Blast Co., Inc., 681 Peninsular Ave., San Mateo, Calif.
We would like your free Vacu-Blaster catalogue_____ Wish to arrange for demonstration_____ Our problem is_____

Name_____ Position_____

Company_____

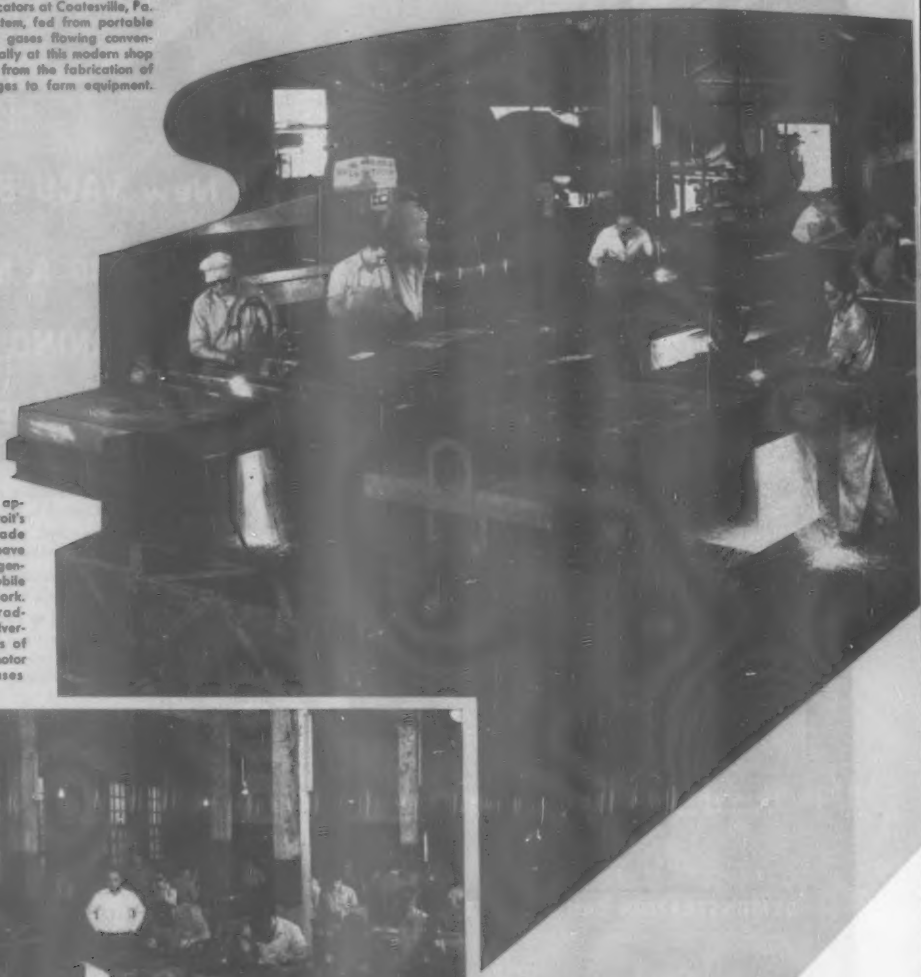
Address_____

2258

Time-tested, performance-proved!

REGO*

Rego KX Hand Cutting Torches and NCG's Cut-O-Matic and RS Cutting Machines speed production at Welded Steel Shapes, Inc., structural steel fabricators at Coatesville, Pa. NCG's pipe-line system, fed from portable banks, keeps NCG gases flowing conveniently and economically at this modern shop where work ranges from the fabrication of buildings and bridges to farm equipment.



Rego welding and cutting apparatus is used at Detroit's Wolverine School of Trade where for 20 years men have been expertly trained in general welding and automobile mechanics and body work. Last year Wolverine graduated 2100 students. Wolverine, source of thousands of skilled workers for the motor industry, uses NCG gases

*T. M. of The B. B. Co., Chicago

For the past 15 years NCG gases and Rego flame-cutting and welding apparatus have been used in the plant maintenance program of Standard Steel Spring Co., Coraopolis, Pa., manufacturers of automobile springs and bumpers. In the picture above the maintenance crew is seen at work at Standard's No. 2 plant at Coraopolis. Standard has other plants at New Castle, Pa.; Newton Falls, Ohio; Allegan, Mich.; and Gary and Logansport, Indiana.

You, too, can save hours and dollars with efficient, dependable REGO apparatus

NCG®

EVERYTHING FOR WELDING

NCG is recognized as one of the largest organizations of its kind in the world. It operates 73 manufacturing plants within the United States, offers supply and service by a vast network of hundreds of authorized NCG dealers and warehouses. For assured satisfaction in *your* welding and cutting needs . . .

RELY ON NCG

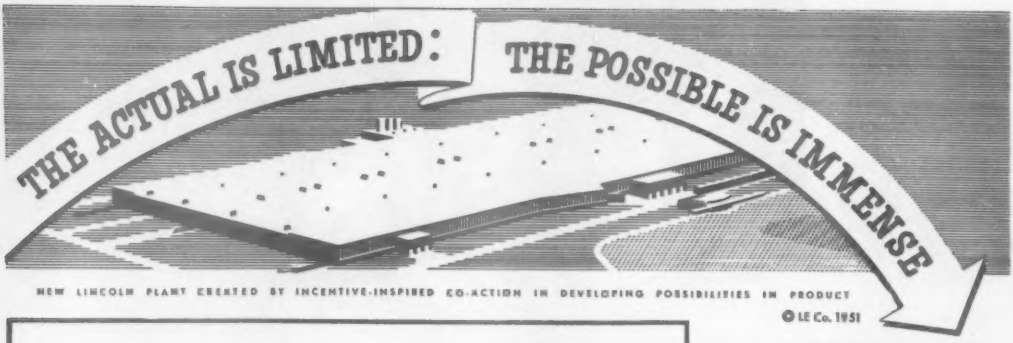
Accuracy has long been an outstanding characteristic of Rego Oxy-Acetylene Cutting and Welding Apparatus—and when you couple accuracy with efficiency, dependability and economy—you have a combination that can't be beat . . . Why don't *you* see if thoroughbred Rego equipment doesn't help *you* save gas, do better work, speed production—as it has for *thousands* of others? Rego is a pioneer line, tested by time, backed by 30 years of leadership!

NATIONAL CYLINDER GAS COMPANY

Executive Offices:

856 N. Michigan Avenue, Chicago 11, Illinois

Copr. 1951, National Cylinder Gas Co.



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1951

DESIGNS THAT UTILIZE THE ECONOMIES OF WELDED STEEL ARE ALWAYS LOWER IN COST

1 There is a 2 to 1 advantage pound per pound between the cost of steel and iron.

2 There is an additional 4 to 1 advantage with steel since 75% less metal is required to achieve equal strength.

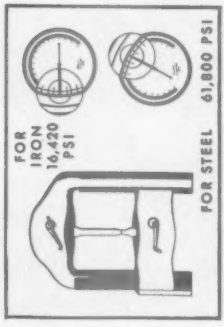
3 The design advantages are unlimited. Through origineering,* the designer is better able to locate the stronger materials in strategic areas, achieving maximum load-carrying capacity per pound of metal.

4 Production efficiency is greater. The shop can fabricate economically in any quantity . . . with a minimum of equipment and setup cost.

A Challenge to Industry

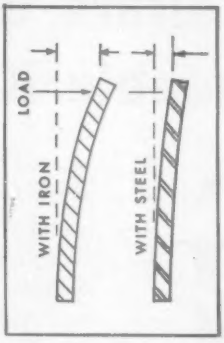
The greater potential economies possible with welded steel originate with design. To utilize the full benefits of steel requires new concepts in mechanics and appearance. Your Lincoln Welding Engineer can show you how to achieve these benefits in your designs . . . to build better products from less material at lower cost. Write The Lincoln Electric Co., Cleveland 1, Ohio.

*Origineering . . . the science of originating new engineering designs.



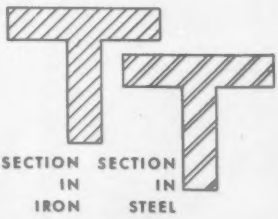
Steel is 3 Times Stronger. *Has 4 times the resistance to fatigue.*

Steel is Ductile. *Withstands impact and shock without fracturing.*



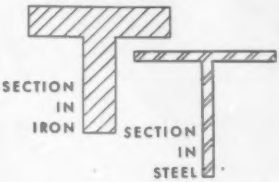
Steel is Twice as Stiff. *Only half the material is needed in welded steel designs to achieve equal rigidity.*

the ACTUAL



Saves 50% Material Cost *by duplicating cross section in steel.*

increasing the YIELD



Needs 60% Less Metal *to achieve equal strength.*

the IMMENSITY of the POSSIBLE

An initial 7 to 1 cost advantage with welded steel

SEE HOW WELDED STEEL CUTS COSTS

Machine Design Sheets are available to designers and engineers. Simply write on your letterhead to Dept. 74

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 1, OHIO

ESTABLISHED 1916 THE WELDING ENGINEER APRIL, 1951

Men—Our Secret Weapon

THERE IS a lot of weird and wonderful talk these days about the necessity for drafting 18-year-olds into military service. Those who are arguing for it tell us, true or not, that Russia drafts youths of 17 or even younger. This argument makes us wonder: do they want us to pattern our way of life upon the way they live in the land of the Soviets? If that's true, if that's what they're really striving for, then let's go whole-hog in copying Russia. Let's also copy the jealous zeal with which she guards her precious scientific and technical man-power.

Scientists, mathematicians, technicians of all kinds including engineers constitute America's true secret weapon. It has been the know-how of our technical men, unfettered under a free economy, that has made the United States the best nation on earth in which to live and work. We can outproduce any other country in the world and still have more leisure time, live better, eat better and get more enjoyment out of life. We can, that is, if our engineers are allowed to do the job. And IF—a large "if" in capital letters—there are enough of them.

Experience has shown that this country needs a minimum of 30,000 engineers a year just to fill our civilian needs. Just for civilian needs. We'll leave it to your imagination to calculate how many engineers will be needed for the nobody-knows-how-many-billions-of-dollars defense program now in the making.

Last June 50,000 engineers graduated from our colleges and universities. So far, well and good, but only 32,000 engineers will be graduated next June, according to a report issued by the American Society of Engineering Education. After that the situation will gradually worsen.

Practically all the 50,000 engineers who graduated last June were absorbed by industry, at jobs paying $250 and up per month, yet during the summer months some so-called "guidance counsellors" went around with propaganda to the effect that there was "no future in engineering." Result: vacant chairs in the freshman classes of engineering schools last fall.

The draft also scares the high school graduate. Instead of enrolling for an engineering course, he feels that he should grab the "big money" he can earn by working at a full-time job until his number is called.

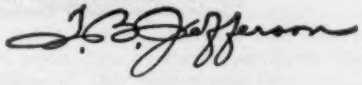
Last fall only 130,000 engineering students were enrolled in our colleges. Allowing for the normal number of "drop outs," there will be 21,900 engineering graduates in 1952, 17,000 in 1953 and only 12,400 when the present freshman class graduates in 1954. These figures may rapidly become worse unless Selective Service begins to defer budding engineers, scientists and technicians.

If the Draft Boards are allowed to have their way and follow today's program of drafting all young men except psychoneurotics (real or faking), the number of engineering graduates in 1954 will drop below 9,000. This is 21,000 short of the engineers we will need just for civilian life.

You can't eat your cake and also put it away to meet future needs. If military authorities continue the present asinine policy of gobbling up all the youth of the nation, our defense efforts will be completely bogged down because of a deficiency in technical know-how. Selective service would be wise to lay more emphasis upon the "selective" part of its name and less upon the "service."

During the last war we saw too many engineers wasted by being given a gun, a shovel or a clerical job instead of being assigned where their technical training could be useful. Why make a clerk out of a welding engineer when the army has a constant demand for welding engineers? Things like that were done constantly.

This nation is no longer in the position where it can continue to waste its resources through stupidity. If the elder statesmen who have been guiding us along paths "to keep out of war," or so they say, would sit down and do some straight thinking on the problem, they probably would not be so concerned about drafting 18-year-olds. As it is, in the muddled way in which they are now thinking, they will probably be finding it necessary to draft 15-year-old girls before too long.



Give your welder a chance to be proud of his footage!

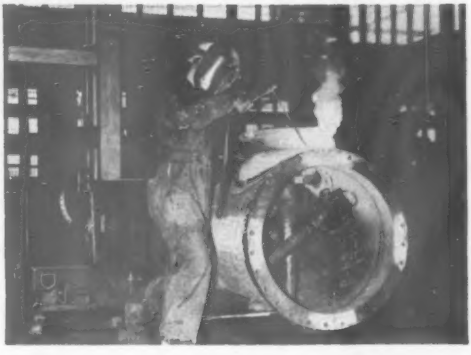
It's *waste welding time* when welders have to climb over, prop up or flop the work piece to get at the different seams.

It's *all arc-time* when Worthington-Ransome Turning Rolls and Welding Positioners are used. All welds can be tilted or turned into position—without delay—for continuous downhand welding.

Result—up to 50% more footage, *better* welds (using higher current and heavier rods), less welding rod waste.

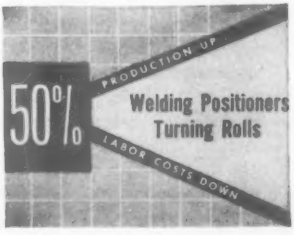
Write Worthington Pump and Machinery Corporation, Dunellen, New Jersey, for bulletins or additional information.

With one set-up, work piece may be tilted and rotated for either automatic or manual welding. Welding Positioner capacities from 100 lb to 30 tons.



Production goes up on manual or automatic welding, whether repetitive or job work. Turning Rolls from 3 to 150 tons, stationary or self-propelled.

WORTHINGTON



LIFE GUARD'S chair was made by welding stainless pipe and sheet

"MOST BEAUTIFUL swimming pool in the world" is what they call it. But it takes a lot of work to keep it that way because of salt-water corrosion

Welding at the St. George

From the salt-water swimming pool to the basement piping, everything at this 2,632-room Brooklyn hotel is kept ship-shape by a crew of highly skilled weldors.

BY JACK MEDOFF

THE WORLD'S second largest hotel owes much of its reputation to its willingness and ability to utilize welding in its program of up-to-the minute maintenance.

The Hotel St. George is made up of a group of buildings in downtown Brooklyn, N. Y. A "city within a city," it occupies an entire square block in the home of baseball's "bums." There are 2,632 guest rooms, a world-famous swimming pool lined with gold mirrors, a large ballroom, many banquet halls and restaurants . . . and a subway station right in the building.

MILLION-DOLLAR POOL

Its 120 by 40 ft indoor swimming pool, the most luxurious in the world, cost more than one million dollars when it was built in 1929. This "indoor ocean" is fed with natural salt water by three large deep-well suction pumps that refill the pool more than three times daily.

MEN BEHIND THE SCENES

A hotel is more than a plant—it's people. There are the people that the public meets—room clerks, bellmen, elevator pilots, waiters, etc.—and there are men the public never hears about, who stay behind the scenes to watch over and help maintain their little community in working order.

One of the latter is Chief Engineer Bill Ledsham. Quiet and soft spoken, he's very proud of his crew, many of whom have been there longer than he has. Versatility, he says, is a must in keeping a large hotel in tip-top shape. And Bill Ledsham should know, too, because prior to coming to the St. George, he was chief engineer at the Chalfonte-Haddon Hall in Atlantic City, N. J., and both hotels have similar maintenance problems—salt-water corrosion being one of them.

Bill Ledsham lives at the hotel so he can be handy at all times, but he never worries about the men under him. The regular staff includes two full-time weldors and three or four other men who can weld and cut when needed. Their skills include metal-arc and argon-arc welding, gas welding, brazing and silver soldering. All of the refrigeration piping is silver soldered, and all contact points of circuit breakers, motor starter contactors and elevator contactors are silver-faced.

To Ledsham, a good maintenance staff is a necessity not just a convenience. Fortunately Treasurer Manfred Messner, of managing agents Bing & Bing, Inc., thinks so too. With an ingenious and versatile crew, he feels, the hotel can do jobs cheaper than outside contractors can and do some jobs that many contractors can't handle. They offer steady jobs with security, and the men seldom leave. The ability to start jobs without delay often makes for an economical operation. For example, when the hotel's low-pressure steam system was put in, all the welding was done on the premises by regular employees (bottom right picture, page 19).

SHADOW-BOX frame for illuminated painting on display in the Crystal Room. See the picture at right

PICTURE FRAME at left was made by brazing perforated black iron sheet (frame) to a galvanized facing

"Maintenance" jobs range from picture frames to building a hydraulic press

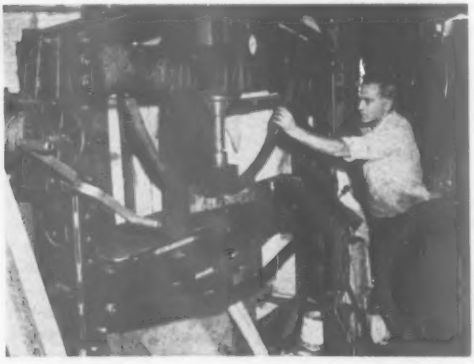
The St. George uses a wide variety of metals—stainless steel, Monel metal, bronze, copper, black iron, galvanized—in its many maintenance jobs. Much ingenuity is also called for.

Monel Shower Valves

For example, a water shortage curtailed the use of fresh water throughout the New York City area. The St. George got around that by using the pool's deep-well pumps to pump salt water to the showers. Brass shower valve bodies lasted only a short time. Stainless didn't withstand the corrosive effects any too well either. Best material was Monel, but Monel shower valves don't come as a stock item. Bids to manufacture them were prohibitive so Ledsham's crew decided to make them themselves. Monel bar stock was drilled and tapped to size, and then the assembly was welded and finished off. The picture at the top left of page 19 shows various stages in fabrication. The job was licked economically, and those shower valves are still in service today. They can't buy Monel valve seats either so they make them also—and insert a new seat whenever one is needed.

"Maintenance" at the St. George includes many strange requests from topside: making flower boxes for the newly redecorated Cafe Bar (done by argon-arc welding 20-gage 18-8 stainless), for instance, or stainless sand jars for cigarette butts or shadow-box frames for illuminated paintings (pictures at top of this page). The latter frames were made by brazing light-gage ornamental perforated black iron sheet, formed to make the frame, to galvanized sheet cut out to the contour of the decorative facing. The crew licks each problem as it crops up.

It is now time to mention Master Mechanic Joseph Church, the man in charge of the special projects division. Joe came to the St. George in 1921—it will be 30 years very soon—and they haven't stumped him yet. He's an expert weldor and tool and



50-TON hydraulic press was home-made except for the pump and cylinder. It cost the St. George only $300

PALLETS for storage of potato sacks and racks for milk cans were made by welding pieces of scrap pipe

CORRODED shower valve bodies of brass (right) were replaced by valves fabricated from Monel stock (left)

BENCHES in shower room are also stainless. Bases are rolled cylinders and seat coverings 20-gage sheet

die maker. Tools and dies are no mystery to him. He'd as soon make 'em as buy 'em—and quite often has to.

Likes Stainless Steel

He's sold on stainless steel, for its excellent appearance as well as corrosion resistance, especially since he can argon-arc weld light-gage sheet and has even rigged it up for semiautomatic operation with a crawler.

Joe is mighty proud of his friction saw—it has a speed of 10,000 ft per minute and can slice through ¼-in. stainless stock like cheese. It was one of the first friction saws delivered in this area, and he had to wait a long, long time for it. Now with this saw, stainless-steel sheet and inert-arc welding, he is making the hotel, brighter, cleaner and more beautiful.

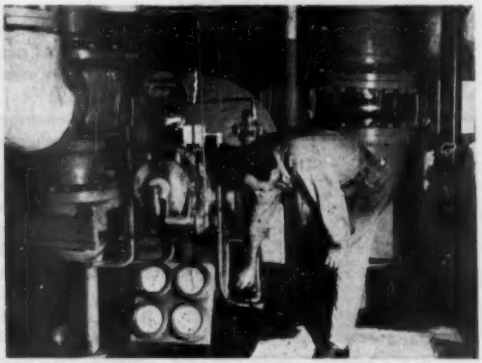
It was hard to pin him down to remember all the places in the hotel where welding has been used. He's been there a long time, and there are many such places. The laundry, kitchen, restaurants, lobby, ballroom, swimming pool—all of them have been improved by welding and they show it.

However, much of Church's time in recent years has been concentrated on the hotel's beautiful swimming pool.

Salt water may be refreshing to people but not to metals. Add to salt water, shower rooms and steam rooms that are generally drenched with moisture, and you will have corrosion problems. So they have standardized on stainless wherever possible. And where stainless doesn't lick salt water corrosion, Monel is used.

DOORS of steam rooms were fabricated on the premises from stainless steel. Likewise the ceiling

WORN SEATS of deep-well pump sections will be replaced by stainless-steel rings fabricated by welding



LOW-PRESSURE steam lines were rewelded by regular employees. Note weld in 20-in. main behind engineer

LAUNDRY machines as rebuilt with new drums, ribs, linings, etc. Only side-frame castings were salvaged

54-IN. EXTRACTOR was too old to get replacement brake ring. So wornout ring was built up by welding

Stainless pipe is welded to make the guard rails, diving platforms and life guard's chair. Stainless pipe and sheet are welded into benches to replace concrete benches that have become cracked and discolored. Picture at (top right of page 19) shows several of the benches in the shower room. The bases were made by welding 3/16-in. plate stock into 8-in. cylinders and welding them to bottom flanges. Seats are maple planks covered by 20-gage stainless-steel sheet. Finishing of most welds is so good that the joints are hard to distinguish from the base material.

Doors for Steam Room

One of their most successful jobs, stainless-steel doors for steam and hot rooms, was practically forced on them. The doors were to be made of 18-gage and the bucks of 16-gage stainless sheet. "Buck" is the trade expression for the one-piece metal door frame and trim. Anyone who has had to bend 18-8 stainless sheet knows how springy it can be. It tends to jump back from the bend when released. The outside contractor had trouble making the bends so they took the job over themselves. You can see the finished result in the right center picture of page 19. According to Messner, what would have cost them $1,000 per pair to purchase was done for about a quarter of that amount.

In the case of the steam room window, it was too difficult to bend the framing to shape. So sheets cut to size were fitted up and edge welded. The corners were then ground smooth and polished.

Renovation of a Laundry

Ever stop to think how much of a successful hotel operation depends on clean linens? Most big hotels run their own laundries, and the St. George is no exception. To provide fresh linen for the many rooms, restaurants, banquet halls and pool is a large-scale business. Furthermore, the laundry must give the typically rapid service that is expected of hotels. The sanitary requirements of a laundry make it an ideal place for stainless, and welding is useful there, too.

Three old laundry washing machines that were set aside for scrapping were taken in hand by Church and completely rebuilt. The only salvageable parts from the body were the side-frame castings. The innards —perforated tumbling drum and lining—are new stainless-steel sheet. Today all three machines are in regular operation.

These machines took time to rebuild. To do this and other jobs, Church tried to buy a 50-ton hydraulic press. Nothing was available and deliveries were impossible, especially since he wanted an extra-wide press. So they built it themselves. Supporting members were cut to shape from ¾-in. plate. Except for the pump and cylinder, the press was entirely home-made (see photo at bottom left, page 18). They spent about $300 on it, only a fraction of the cost of a press on the market.

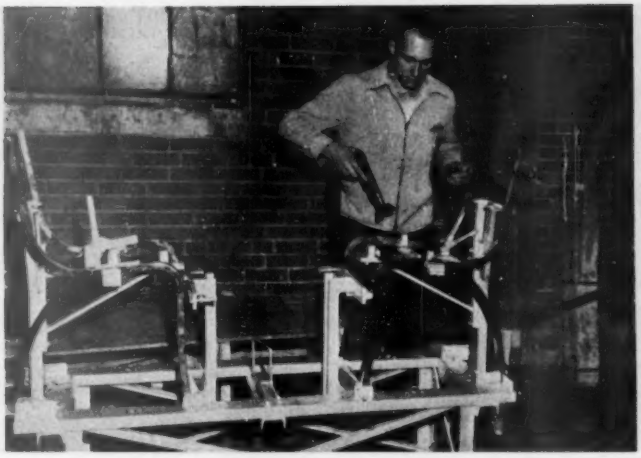
In and around the kitchen are all kinds of examples of welding handiwork. Some of these products are distinctly out of the ordinary: for example, an oyster opener. It was made out of stainless steel for $50, replacing a wornout brass one costing $65. Storage pallets for milk cans and potato sacks were made from scrap pipe by welding; they replaced wooden racks that had become messy, unsightly and were easily broken. Another job was to make several hundred or so boxes of stainless and Monel to replace older wooden boxes holding silverware.

Reclaiming Pumps

Occasionally the salt water deep-well pumps are taken down for repair. Each pump has 13 sections (see photo at bottom left on page 19), and the casings and impellers are subject to pitting and corrosion. Ring inserts are bent to shape from stainless plate stock, welded and finish ground. Then they are pressed in and tack welded to the casing.

Having its own men on the premises when repairs suddenly become necessary is a great saving to the St. George. When the cast-iron oil-relay-valve governor on the turbine lets go, they repair it themselves. So far, three such valves have been repaired, and each time they have saved the cost of a new governor as well as the time lost for shut-down.

The management says: "Welding is not a luxury to us. We wouldn't know what to do without it."



1—CHAIRS ARE assembled for spot brazing in this two-position fixture

2—BRAZE WELDING top of frame

Spot Brazing Chair Frames

IT COSTS a lot to crate and ship a metal-frame chair. The Arnolt Corp., Warsaw, Ind., which manufactures chromium-plated chairs of the dinette and card-table type, wasn't very happy about the high shipping costs. The company's chief engineer, C. W. Harrison, was asked to do something about it.

Harrison began by tackling the problem at its fundamentals. What makes a chair costly to ship? Bulk. What makes it bulky? Waste space. Can this waste space be eliminated? Not by conventional means, No. But what if the chair is shipped broken down into its component elements?

That was the answer. Arnolt now forms the frame parts from square or round tubing of 18-gage wall thickness, chrome plates them, drills them, and then ships them to various assembly cities. Local distributors weld the frames and attach seats and backs.

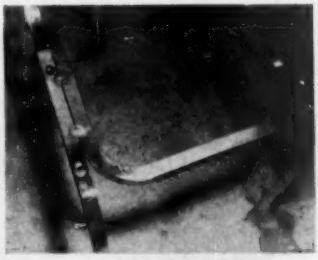
This very neat idea depends for its success upon: *(a)* a simplified method of production assembly and *(b)* a welding process that can weld plated steel without burning off the plating or leaving rough spots.

Requirement *(a)* wasn't too hard to figure: a standardized jig that could be sent to local assemblers so that each chair would go together in the same way and with a minimum of production time. This jig turned out to be a two-position fixture (Fig. 1), in which one chair frame can be welded while the second one is being assembled.

Requirement *(b)* was met by inert-arc spot brazing. This process makes use of a pistol-grip water-cooled "gun." Ordinarily, the weld is made by melting through the uppermost of two lapped sheets until it fuses with the lower sheet. Arnolt has introduced some modifications to the conventional process. As used by Arnolt, the process is really braze welding since silicon-bronze filler metal is added. The inert-arc gun has a square-shaped head to contact the outer edges of the tubing, and a ⅛-in. silicon-bronze rod is pressed into each hot junction from the side.

Eight such brazed spot welds are made. The first four are on top of the frame (Fig. 2); the frame is then turned over to weld the bottom side. Fig. 3 shows the appearance of some of the welds. Chromium burn-off is kept to a minimum, and the deposited metal is so flat it does not require grinding for the seat of the finished chair (Fig. 4) to rest evenly.

Production in the field is said to average about 80 frames per hour per two-man team. Only 2 to 3 seconds are required to make a spot. The gun uses a ⅛-in. tungsten electrode. Current is 175 amp, a-c, with superimposed high frequency. Argon flow is 6 liters per minute.



3—CLOSE-UP of four top welds. Deposited metal is flat, allowing seat to rest evenly on the frame

Photos courtesy Linde Air Products Co.

4—SEAT and back are attached to holes drilled in frame members

1—POURING ROOM, Electric Steel Works. Four crane girders are 6 ft 6 in. deep and cover a 56-ft span. A 26-ft clearance is provided under crane. Roof trusses taper from 8 ft 6 in. on inside to 3 ft 4 in. outside

In Italy It's

BY A. BOZZARELLI
Director-Engineer of the Ilva Corp., Genoa, Italy

More harmonious than triangulated trusses, the Vierendeel truss design offers other advantages such as better corrosion resistance and lowered maintenance.

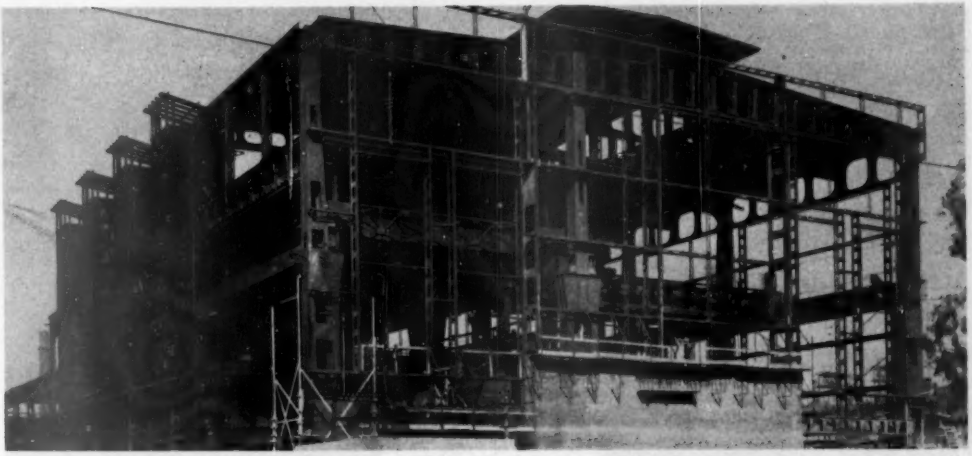
SEVERAL years ago I was in charge of the construction of two Italian steel mills that were featured by structural members of the Vierendeel type. These trusses were nearly all arc welded. Aside from the Vierendeel trusses, another unusual aspect of the job was the great size of the buildings, as is clearly shown in Figs. 1 and 2.

VIERENDEEL TRUSS ADVANTAGES

Vierendeel trusses are, in the opinion of the writer and others, more harmonious than triangulated trusses. The basic geometric figure of a Vierendeel truss is a quadrangle, and this type of structure has appropriately been described as a truss without diagonals. The flexural stresses in the chords and verticals resulting from an absence of inclined web members require that the joints be made capable of resisting bending moments; this can be done rather easily if welding is a method of fabrication.

With present availability of beams and wide-flange sections, the cost of handling and fabrication of a Vierendeel truss should be no more and might be less than that of a plate girder or truss with diagonal and vertical members under similar span conditions. The design of the Vierendeel truss is such that it has no eccentricities at any of the joints. Consequently, the calculated stresses are more representative of the true stresses than those calculated for a plate girder or for a truss with diagonal and vertical members.

3—CHIMNEY HOODS, also executed with Vierendeel trusses, are 15 by 23 ft and have a height of 90 ft

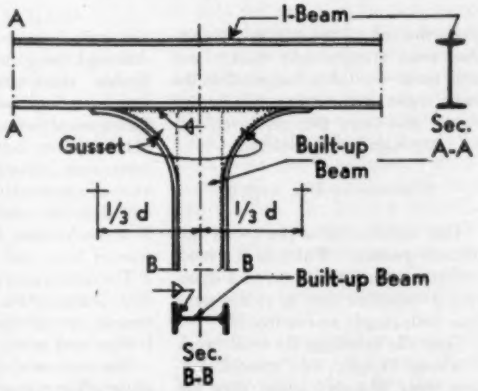


2—FURNACE ROOM is 140 ft wide, 400 ft long and has a height of 104 ft. It was designed with trusses on 40-ft centers. At the left are chimney hoods, shown in more detail in Fig. 3. These are for Bessemer furnaces

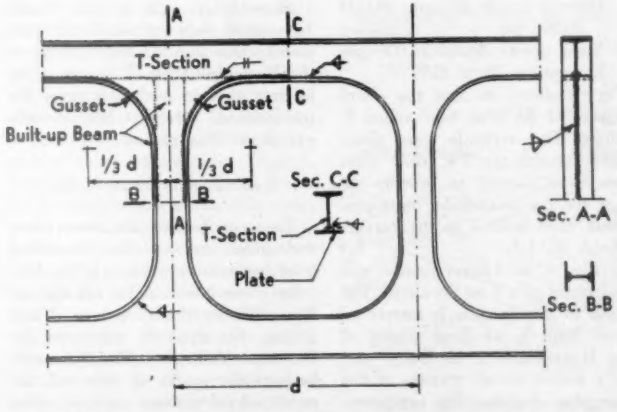
Vierendeel

It is my opinion that the Vierendeel truss is much more pleasing in appearance than a plate girder or a truss with diagonal and vertical members. The repetition of rectangular openings with rounded corners creates an eye-catching pattern. The ratio of panel lengths to height is greater than unity, yet the appearance is one of harmonious uniformity in the design. However, it is necessary to apply the same care to the outer lines as to the interior arrangement, so that the framework will express itself in simple lines.

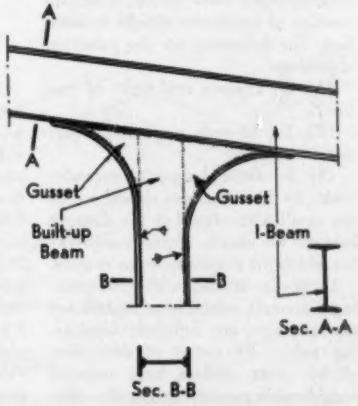
Under most conditions, I believe the probable life of the Vierendeel truss is longer than that of a plate girder or the conventional truss of diagonals and verticals



5—I-BEAM section replaces the T-section of Figure 4



4—DETAILS of truss design for a Vierendeel member made by welding



6—TRUSS DESIGN for sloping roof

(Left)
7—WIDE variety of Vierendeel trusses are needed on the inside of this Italian steel mill. Four different kinds are shown in the picture

(Right)
8—CRANEWAY girder is made up of two Vierendeel trusses that have been paralleled together by welding. Column is built up of two I-beams welded into an open box column

since the roll sections in the Vierendeel truss are generally thicker and will resist corrosion longer. For the same reason maintenance will be less costly, and there are, moreover, not so many members to maintain.

Question of Eye Appeal

This opinion gives rise to an important question: Which is the most convenient form to impart to a structure a character that is at the same time both simple and rational?

Generally speaking, the trellis work of a truss (English roof truss, Polanceau truss, Monsard truss) does not have the eye-appeal that characterizes the plate girder. For pleasing appearance in metal construction, a certain number of conditions should be satisfied. The following are the principal objectives:

(1) To attain a real unity of outline;

(2) To use only very simple geometrical forms;

(3) To avoid designs of excessive scale; *i.e.*, the members should not be too small with regard to the distance between the chords (flange members) for which the diagonals serve as webs.

Large-size trusses with criss-crossing diagonals, which were in style not too long ago, are definitely displeasing today. By virtue of their simplicity, plate girders have enjoyed considerable success; generally, they give to the structures to which they are suited an aspect of strength. Although the plate girder is good for bridge construction, however, it leaves an impression of disorder in wide-span structures having considerable distance between trusses. The truss most suitably adapted to that kind of construction is the type without diagonals: the Vierendeel, which is a compromise between the trellis-type of truss and the plate girder.

The accompanying sketches, Figs. 4, 5 and 6, show the details of the trusses we designed for the two Italian steel mills.

The steel used in the construction of these Vierendeel trusses was typical structural grade steel, having the following characteristics:

Ultimate tensile strength: 60,000-70,000 psi.
Yield point: 30,000-35,000 psi.
Elongation: 20 to 25%

Fig. 4 shows us that the chord members of the truss were rolled T-sections. The verticals were plates welded between the T's, while other plates were formed to provide the flange for the rectangular openings. Gussets were welded in the corners to finish the job.

In Fig. 5, an I-beam section was used instead of a T on the chord. The vertical in this instance is merely an I-beam built-up of three pieces of plate. It was flared at the end to provide a radius on all corners of the rectangular opening. The same condition applies to tapered roof trusses, one of which is pictured in Fig. 6.

Professor Vierendeel took occasion to write to the author of this article in order to congratulate him on having been the first one to employ the Vierendeel truss on large structures; until that time the Vierendeel had been used only for bridges.

The Vierendeel truss is a structural member of an extremely logical construction and of an indisputable elegance, and it is probable that, little by little, it will eventually become a substitute for triangulated trusses. The invention of the Vierendeel offers all characteristics of originality (scientifically as well as technically) in a realm where really important inventions are rather scarce.

Skyscrapers with a rigid frame (structural steel or reinforced concrete) came into existence thanks to the Vierendeel truss. It is interesting to note that in such structures the triangulated solution has already practically disappeared.

Calculating Difficulties

The writer believes the reason more widespread use of the Vierendeel truss has not taken place is the difficulty encountered in its calculation. This difficulty does not exist if one utilizes the methods conceived by Professor Vierendeel. The difference between the results of tests and the results of calculations generally does not exceed 5% to 6%. The real

constraints that have been established are from 5% to 6% lower than those obtained by calculations.

The calculation and design arrangement of the Vierendeel trusses have become the object of a great number of research tasks. Among these may be mentioned the tests with reduced-scale models made of glass, celluloid, Bakelite, etc., which were carried out notably by Professors Coker, d'Oxford and Baes of Brussels (photoelasticometry); Magnel of Ghent (mechanical tests by means of the influencemeter); Campus of Liege, and Dustin of Brussels (study on knots); Abramov of Kiev, etc.

Likewise noteworthy are the researches carried out with a view to the determination of the rise and constraints of spans. This latter research work is the most complete and merits a special citation.

The results obtained from all these experiments have confirmed the exactness of the formulae established by Professor Vierendeel and have shown that the experimental results differ only slightly from the data given as a result of calculations.

The different types of Vierendeel girders in existence are:

(a) Girders of parallel chords;

(b) Girders of parallel chords in the center parts;

(c) Girders with curved upper flanges or polygonal chords.

Constructed by Welding

The fabrication of Vierendeel trusses is now made easy by welding, which permits us to simplify notably the corners of the framework and the gussets. The gussets must be curved in order to adapt themselves tangentially to the vertical members and to the chords. We have employed this arrangement in the construction of several metal structures, the most important being the Electric Steel Works of Ilva Corp. in Bagnoli (Naples), Italy. On this job, the posts or beams for the aerial rail conveyor that transports ore and limestone (front cover) and the chimney hoods (Fig. 3) are made of Vierendeel trusses. Details of the upright columns and the Vierendeel truss supporting the curtain wall appear in Fig. 7. A close-up of the craneway girder (Fig. 8) reveals that it was built up of two Vierendeel trusses welded together. The column in the same picture was built up of two I-beams welded to form an open box column.

Inasmuch as no double T-sections were used, the columns or vertical members were sections built up from plates by arc welding. The top and bottom flanges were conventional H-beams. As much welding as possible was done in the shop in order to keep the field work to a minimum (welding was not available in the field). Shop fabrication was, of course, limited by the size of girder that could conveniently be transported. Were it not for this restriction, the entire job would have been shop welded so as to cut down the field work to that required for erection.

Since field welding was not available, the girders were assembled by riveting after they had been delivered to the site. First, however, they had to be suitably reinforced at the spots where the holes were.

With the exception noted, the trusses for the Electric Steel Works of Ilva were entirely of welded construction. We used some riveted beams, however, on the Thomas Steel Mill of the same corporation. The simultaneous utilization of welded and riveted members permitted us to reduce the time of construction by a considerable amount.

The pictures which accompany this article well illustrate the good appearance that may be obtained from the employment of Vierendeel trusses.

Cosmotron Coil Silver Brazed

By E. W. MOLES*

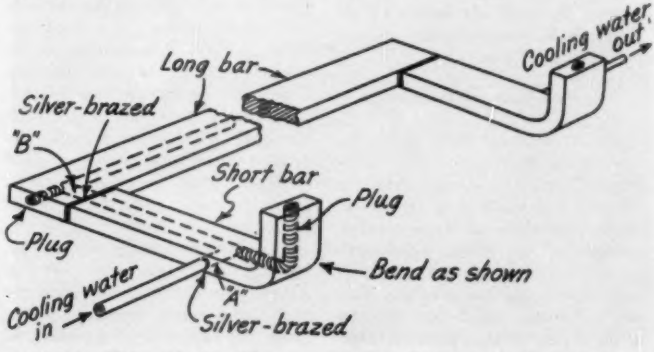
Successor to the cyclotron, the new 2-3 billion electron-volt "cosmotron" at Brookhaven National Laboratory has a copper coil made up of 384 extruded copper bus bars 52 ft long. These bars are 2¾ by ¾ in. in section and have a center tube for water cooling. The bars are ultimately stacked to encircle each of four C-shaped quadrants.

A quadrant bar is made up of a long (52 ft) bar with short (4 ft) bars silver brazed at right angles on each end of the long bar. Brazing was selected by Brookhaven engineers to avoid the high heats that might cause warping.

A simple, lightweight jig was made to hold the bars and the twin oxyacetylene heating heads. Each heating head has threaded tips which could be plugged to allow the heating pattern to be varied until exactly the right pattern was found. After the weldor had cleaned and fluxed the areas to be joined, he inserted silver-brazing alloy and clamped the bars into position. The brazing operation was then merely that of lighting the flames. When one end was brazed, the operation was repeated on the other to provide the completed quadrant bar (see sketch).

Total time required to prepare a bar was less than 4 minutes. Each butt joint was made in less than 1½ minutes. Sample joints showed tensile strengths of 45,000 psi—almost equivalent to the tensile strength of the bars themselves.

*Process service engineer, The Linde Air Products Co.



BAR for billion-volt Brookhaven cosmotron. Ends of longitudinal holes for cooling water were plugged and tubes brazed on at points "A" and "B"

1—AT FIRST of seven work stations, factory control man tests turbine casting by magnetic particles

2—PREHEAT (imparted at second station) is maintained by means of gas torches and asbestos blankets

How We Repair Steel

Semiautomatic submerged-arc welding has proved itself to be a potent new tool for repair of the intricate high-temperature, high-pressure castings produced at the Everett steel foundry of the General Electric Company

BY ALFRED E. BLAKE, JR.
Ass't. to Foundry Divisions Manager, Apparatus Dept., General Electric Co.

THE MANAGEMENT of the Everett steel foundry of the General Electric Co., Everett, Mass., looks upon submerged-arc welding as a new tool to use in repairing steel castings. It takes its place along with the already existing tools of chipping, grinding, flame-gouging and manual arc welding, all of which are used in the repair of the relatively intricate high-temperature, high-pressure castings produced at Everett.

"Casting Repair" Operation

The management has established a job classification known as "Casting Repair." Operators coming under this category are qualified to perform all of the functions of flame-gouging, conventional arc welding, submerged-arc welding, magnetic testing and incidental chipping and grinding. Most of the discussion that follows pertains to the repair of high-pressure, high-temperature turbine castings, and it is our practice to make repairs after these castings have been rough machined. X-Rays, when required, are also taken after rough machining and before repairing.

The establishment of the overall "Casting Repair" job took place when submerged-arc welding was introduced to the foundry. Previously, it was our practice to have castings that required repairs moved to work stations for processing. There were ten separate work stations: (1) preliminary overall 100% magnetic test; (2) casting preheat (annealing furnaces); (3) flame-gouging; (4) magnetic testing of weld preparations; (5) casting preheat (annealing furnaces); (6) manual arc welding; (7) stress relief anneal; (8) pressure clean; (9) chip and grind welds and clean inaccessible internal steam passages; (10) final overall 100% magnetic test.

This does not tell the whole story. Castings had to be moved between stations 5 and 6 many times in the course of a repair because the relatively slow rate of metal deposition of manual arc welding allowed ample time for a casting to cool below the permissible minimum preheat temperature.

Castings required so much handling from one work station to another that much time was lost, not only through handling but in waiting in "backlog" storage piles in front of the work stations. Since all areas of a casting were worked on by the magnetic tester, flame-gougers and arc welders, many additional positioning crane lifts were required during the overall repair cycle. It all added up to an undesirably long and expensive repair cycle.

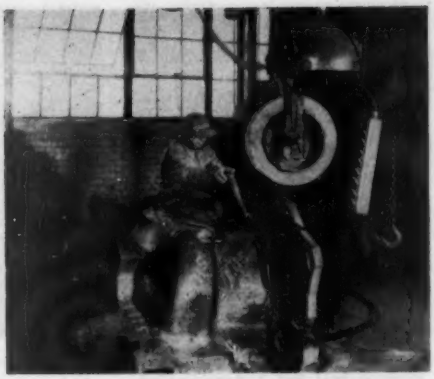
The establishment of the new "Casting Repair" procedure has made it possible to reduce the number of work stations through which the castings must be moved to seven. These work stations are: (1) preliminary overall 100% magnetic test; (2) casting preheat (annealing furnaces); (3) casting repair; (4) stress relief anneal (annealing furnaces); (5) pressure clean; (6) chip and grind welds and clear inaccessible internal steam passages; (7) final overall 100% magnetic test.

Let's pay a visit to each of the above listed work stations to see exactly what work is performed there.

Preliminary Magnetic Test

This operation (Fig. 1) consists of the use of dry magnetic-powder prod testing equipment to cover all accessi-

3—CASTING REPAIR operator positions turbine casting for welding. Same man can do flame-gouging, inspection, etc.



4—SEMIAUTOMATIC submerged-arc welding offers many advantages in repair of the castings

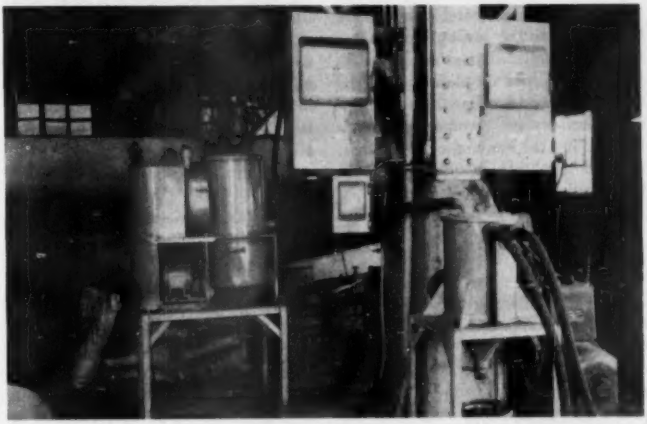
Castings

ble internal and external surfaces and fillets. A 600-amp d-c arc welder furnishes the current. The special prod holder employed contains a pushbutton for controlling a field current interrupting relay. There are two pointed copper prods, and spacing between them can easily be varied from 2 to approximately 7 in. A spacing of 5 in. is most commonly used.

When the desired prod setting is obtained and the prods are in contact with a steel plate or the casting surface, a calibrated tong tester is placed around the current-carrying leads and the machine is adjusted to the desired current flow. With a 5-in. prod setting, we employ a current of 500 amp. Using the equipment described above, a single operator can effectively test all of the accessible internal and external casting surfaces. Subsurface defects (such as cracks and inclusions) are marked with soapstone chalk or paint crayon as they are detected.

Casting Preheat

Since the trend in turbine design is toward higher operating pressures and temperatures, the casting compositions specified are for the most part alloys containing molybdenum and chromium. To insure proper weld preparations and welds, the castings are preheated in annealing furnaces at work station No. 2 to temperatures ranging from 100 F to 600 F, depend-



5—FLUX RECOVERY SYSTEM for submerged-arc welding. Reclaimed and sifted flux is obtained by opening the valve at bottom of tank at right

6—FLAME-GOUGING operator excavates marked defects and checks completeness of his work with magnetic-particle inspection before he welds

7—DAMS of molded fire clay are made to hold flux and weld metal at ends of the weld preparation

8—FLAME-GOUGED weld preparation in a box motor casting is a good example of type of work done

9—REPAIR WELD prepared in 8 has been completed by manual submerged-arc welding (semiautomatic)

ing upon the composition of the metal to be welded. The heated castings are then moved to the casting repair area, where specially shaped multiple jet gas heating pipes are placed inside the castings at strategic locations to maintain the preheat temperatures obtained in the annealing furnaces. Insulating asbestos blankets also help to keep up the heat (Fig. 2).

Casting Repair Station

A special area has been prepared and equipped for the purpose of handling the castings that require repairing. This area has a 20 by 40 ft concrete floor and is serviced by a pendant-controlled, power-operated crane that positions or rolls over the castings (see Fig. 3). This crane helps to make the operation independent of overhead crane service and permits the scheduling of casting repairs during off-shift hours (when it would be uneconomical to provide overhead crane service) as well as during regular working hours.

Two semiautomatic submerged-arc welding machines are provided (Fig. 4). These machines are equipped with detached vertically mounted welding wire reels supported on individual jib cranes, also with leads and electrode holders for conventional manual arc welding. Thus an operator can quickly alternate from the use of semiautomatic welding to manual arc welding and vice versa with practically no loss in time.

A single turbo-vacuum flux recovery machine with dual suction lines is located centrally within the area (Fig. 5). This machine has built-in screening units that separate oversized fused flux and other foreign matter.

Oxygen is used with city gas for flame-gouging (Fig. 6). Two flame-gouging stations and two city gas preheating stations are located within the repair area. Compressed air outlets are also provided for sealing hammers, chipping hammers and grinders.

One 600-amp welder (capable of delivering momentary short-circuit currents of nearly 1,200 amp) is located within the area for the purpose of testing weld preparations by magnetic particles prior to welding. This machine is equipped with field circuit interrupting relays so that testing current can safely be interrupted without arcing and the resulting formation of hard spots on alloy steel surfaces.

A camera with photoflash bulb equipment is used to identify and record the location of and type of defects encountered. This is done for the benefit of the engineering department.

When preheated castings are positioned in the casting repair area, the repair operator first places the local preheaters in their proper strategic locations and then proceeds to excavate the previously marked defects by flame gouging. He then checks the completeness of his work through the magnetic-particle inspection equipment at his disposal. When all preparations have been completed, he takes a photograph for the purpose of identifying and recording the location and type of defect. While the casting is still in its original position and still hot around the edges from the preceding flame-gouging operation, he deposits weld metal, using semiautomatic welding wherever possible.

Semiautomatic welding cannot be used where the preparation deviates too far from a horizontal position. In these cases, manual welding with a semivertical technique may have to be used. Clay dams are made to hold the weld metal and flux at the ends of the prepared section (Fig. 7). A typical dam consists of molded fire clay held in place by an Alnico magnet or metal backing strips.

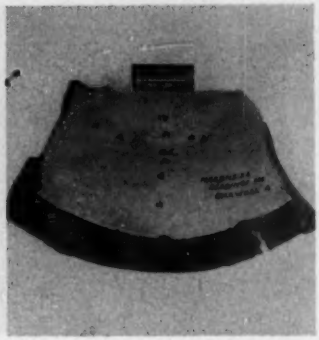
Semiautomatic welding is performed with or without the flux cone. The flux cone is usually attached in cases where welding is done in unobstructed areas but removed where overhanging flanges or other obstacles would interfere with the cone. When the cone is removed, the gouged-out section is filled with flux manually before proceeding with the usual semiautomatic technique.

Trimming Off Backing Strips

After the welds are completed and the unused flux recovered, the operator trims overhanging weld metal and removes backing strips by means of his flame-gouging torch. In certain rare instances, he may do the trimming with chipping and grinding equipment. Such equipment is also employed when the magnetic test pattern indicates: (1) a very shallow defect, (2) the remnant of a defect remaining after removal of the major portion or (3) a small defect in a thin-wall section. In all of these cases, the defect is ground or chipped away in order to remove it without going through the casting wall.

10—STEPS IN repair of casting for a bearing liner. Here we see the flame-gouged weld preparation

11—WELDING of bearing liner casting has been completed (see also picture 10 and picture 12)



12—CROSS-SECTION of repair weld in bearing liner (pictures 10 and 11). Note Rockwell hardnesses

The next step in the repair cycle is to reposition the casting and repeat the procedure just described until all sides and surfaces of the casting have been completely repaired.

A very important factor in the successful functioning of the "Casting Repair" operation lies in the fact that it can be carried out on a continuous three-shift basis. The casting to be repaired does not have to be removed after it has been placed in the area because it can be kept up to temperature by a combination of local preheat, gouging and welding. Welding is performed continuously until the repair is completed. This prevents the casting from experiencing a number of heating and cooling cycles, with resultant stress build-ups, and insures that welds will be made under the most favorable circumstances with respect to preheat. It goes without saying that such a set-up materially reduces the manufacturing cycle by minimizing delays between operations, delays for car preheating and lost time during non-productive shifts.

Stress Relief Anneal

The fourth operation consists in heating the repaired castings in car bottom annealing furnaces. The procedure is in three stages: (1) bringing temperature to approximately 1,200 F, (2) holding this temperature for 1 hr per inch of maximum section and (3) furnace cooling to approximately 450 F.

Pressure cleaning, the fifth operation, is done to remove annealing scale and weld spatter as well as any sand in internal passages that could not be reached prior to rough machining.

The sixth operation is a complex one that includes the chipping and grinding of welds and the cleaning of inaccessible internal steam passages. All welds are chipped and ground smooth prior to final magnetic testing. The "inaccessible passages," those which cannot be reached effectively by the pressure-cleaning operator, are manually cleaned through the use of specially bent chisels with mirrors.

Final Magnetic Test

Seventh and last operation and work station is the final overall 100% magnetic test. This test is supposed to prove the soundness of all the repairs previously made and to insure that the sections of the casting accessible to testing are all completely free from surface or subsurface defects. A second X-ray examination of critical areas may also be called for in certain cases. At this stage, the castings should be perfect; nevertheless, our experience to date has shown that there will be some magnetic build-ups showing at the final testing. We do not yet know with certainty whether these build-ups represent cracks that developed during stress-relief annealing or cracks that existed originally but were unintentionally overlooked during the preliminary and intermediate testing stages. Fortunately, as experience is gained with this problem, these recurring defects are reducing in number and magnitude.

The facilities described above are also employed on carbon-steel structural and electrical castings. On these products, however, X-rays, magnetic testing, preheating and photographing are not required. Figs. 8 and 9 show the weld preparation and completed weld for a box motor casting. Figs. 10, 11 and 12 show flame-gouged preparation and completed weld in a bearing liner casting.

Training Weldors

A considerable amount of training and practice is required before operators can become thoroughly proficient in all phases of the casting repair operation. Each operator must pass qualification tests on the various types of conventional electrodes and on the semiautomatic welding machine. Qualification is based on the operator's demonstrated ability to produce welds that will pass minimum bend and tensile requirements, will be free from inclusions and will show good fusion characteristics. We believe that the submerged-arc welding technique requires less skill and considerably less learning time than conventional manual arc welding. Also, the working conditions for submerged-arc welding are somewhat better due to the fact that neither a welding helmet nor goggles need be worn.

Casting repair operations are controlled by welding inspection to insure that proper preheat temperatures are maintained, that proper welding technique is employed and that the welds are sound as revealed by mag-

(Continued on page 33)

1—PICTORIAL TOUR starts. These students practice welding in flat, vertical and horizontal positions

2—SHOP PRACTICE in gas welding involves joining of non-ferrous metals to ferrous by braze welding

Preparing Men for a

As two pieces of metal are joined by welding to form an integrated whole, theory and practice are intimately united in the curricula of the Milwaukee School of Engineering. Here we see a few of the classes. . .

BY T. B. JEFFERSON

WITH OUR national government yelling for more planes, tanks, warships and what not, the need for trained weldors and welding supervisors will undoubtedly greatly increase. That brings up a question: Where are these badly wanted men going to get their training? Of the many excellent schools of welding in the country, one of the best is the Welding Institute of the Milwaukee School of Engineering. Since it opened eighteen years ago, the Institute has trained over 6,000 persons.

Pictorial Tour

Let's take a brief pictorial tour of the Welding Institute.

In Fig. 1, we see a number of arc-welding students practicing in their booths. They are learning how to arc weld in the horizontal and downhand positions.

Gas-welding fabrication includes flame-cutting. There are 16 stations, as shown in Fig. 2. Both similar and dissimilar metals are welded. The students in Fig. 2 are welding a ferrous to a non-ferrous metal, using a non-ferrous welding rod—braze welding. All types of gas welding and silver-alloy brazing are also taught.

Industrial field trips show the students the important role that welded fabrication is playing in the building of Milwaukee-manufactured products. In Fig. 3 we see them at the Harnischfeger Corp., one of the many firms that uses arc welding for fabrication purposes.

It's no good teaching a man to weld if he doesn't know how to use a chipping hammer. MSOE students are

5—DRAWING CLASS: The student who learns how to draw weldments can also read blueprints intelligently

6—FUNDAMENTALS of electrical measurements in a-c and d-c circuits are learned through lab experiments

3—FIELD TRIPS through Milwaukee plants show student visitors how welding is being used for fabrication

4—IT'S IMPORTANT to know how to use hand and power tools. The student is given practical training

Welding Career

given practical experience in the intelligent use of hand and power tools (Fig. 4). By such training they gain a good understanding of the importance that these pieces of industrial equipment will assume in their future jobs.

Teach Circuit Analysis

As the student continues his studies from welding operator to welding technician, he comes in contact with many industrial phases related to his future livelihood. The group of students pictured in Fig. 5 is the "art class"; they are making drawings that will be used in welding fabricated products. In learning how to make drawings, they learn automatically how to read blueprints — knowledge that will stand them in good stead when they go out into the working world.

Carefully supervised laboratory experiments teach the fundamentals of electrical measurements in a-c and d-c circuits. Fig. 6 shows a group of students solving such problems as apply to welding in the circuits laboratory.

The welding technician also gets first-hand knowledge about the background of welding. He gains metallurgical background, for example, by actually preparing samples of steel for grain structure examination in a high-temperature muffle furnace (Fig. 7).

Industrial organization is an indispensable part of the technician's course. The student learns the organization pattern of business and the importance of the individual to business (Fig. 8).

From 1903 to 1951

The Milwaukee School of Engineering was founded back in 1903 by the late Oscar Werwath with the objective of training skilled craftsmen for industry. By 1932 the school had become a non-profit, quasi-public institution with students enrolled from all of the 48 states and many other parts of the world as well. Welding instruction began in 1933, at the time when the coated electrode for arc welding had just been introduced. Then as now, there was a cry-

7—MUFFLE FURNACE in metallurgical laboratory is used to prepare a sample examined for grain structure

8—CLASS in industrial organization teaches how a company is organized and where individuals fit into it

ing need for men who understood the new process, which had just begun to prove itself far superior for joining assemblies than the time-honored methods of riveting and bolting.

When the Welding Institute opened in 1933, it offered a six-week course of practical welding training in a well equipped laboratory. The Institute's industrial advisory committee — composed of leading figures in Milwaukee and Chicago welding circles—then developed plans to enlarge the original program. Metallurgy, design and allied subjects were included in the course a year later. By 1935 a full year of welding study was on the curriculum. This year's course of study took the student far beyond the knowledge of a skilled vocational worker and provided him with a semi-professional technician's background. Because of his greater training, he was ready to step into a supervisory post immediately upon leaving school.

Steadily the training program of the Welding Institute grew in order to meet the demands of Milwaukee's industries for trained weldors. In 1941 five shifts of day classes were scheduled in addition to the evening instruction. Then this country was engulfed by World War II, and industry began to lose men to the armed forces. To meet the crying need for replacement personnel, Milwaukee School of Engineering was forced to discontinue its welding technician training program and utilize its full facilities for short specialized courses in welding for industrial workers. These also included special classes for the training of women weldors. In January, 1944, a 16-session welding supervisor's program was inaugurated for the further development of men with advanced training in the field of welding fabrication.

Technicians Study 18 Months

Realizing that the present need is for better trained supervisory personnel, the Welding Institute is reactivating the welding technician's class that proved so successful in the period of 1935-40. However, the present training requires 18 months instead of the one-year course previously scheduled. The first six months of the program lead to a combination welding operator's certificate. The student who has a background equivalent to that offered by the welding operator's course (and who otherwise meets entrance requirements) may enter the 12-month welding technician's course without taking the first six months' training.

Table I. Welding Operator Curriculum
Six months (2 terms, 12 weeks each term)

	Periods per Week	Lecture	Lab.	Credit in Quarter Hours
TERM I				
Welding shop methods	5	5	0	5
Arc-welding shop*	6	0	6	2
Gas-welding shop*	6	0	6	2
Hand and power tools	4	1	3	2
Welding drawing	3	0	3	1
Shop mathematics	5	5	0	5
Orientation to industry	1	1	0	0
Totals	30	12	18	17
TERM II				
Welding shop processes	5	5	0	5
Arc-welding fabrication*	6	0	6	2
Gas-welding fabrication*	6	0	6	2
Welding estimating	4	4	0	4
†Elementary algebra	5	5	0	5
Drawing for welding layout	6	0	6	2
Totals	32	14	18	20
†Business organization	3	3	0	3

*Includes standard qualification tests.
†Business organization may be elected in place of elementary algebra if the student intends to terminate as a welding operator.
Upon completion of this course the student receives a service certificate as a welding operator.

Table I lists the subjects covered by the welding operator curriculum; Table II the additional course required for graduation as a welding technician. The latter student must attend 25 hours per week (in term III 26 hours), of which 16 hours are lectures and 9 hours laboratory periods. His work is evaluated in terms of credit in quarter hours. Should the student wish to continue toward a degree in engineering, this work is accreditable toward the degree of Bachelor of Science in Electrical Engineering.

Many students who take up welding do not plan to specialize in that field. Among the welding operator students, for example, are men whose primary interest is refrigeration or heating and air conditioning (another course that leads to a technician's certificate). These students are required to take 24 hours of gas welding; those concentrating on heating are required to take an additional 24 hours of arc welding. The refrigeration, heating and air conditioning graduates are thus equipped to make a limited use of welding, as may be required in their service work.

William J. Weeks, head of the Welding Department of MSOE, enrolled there as a student in 1940—*after* he had 21 years' experience as a gas weldor and a gas welding instructor. He served as a welding instructor at MSOE from 1941 to 1943, had a two-year interlude in the shipyards and returned to Milwaukee School of Engineering in 1945. Mr. Weeks is thus a very practical man. Under his skilled leadership, the school's welding instruction has been expanded to the point where it is now generally recognized as one of the best training programs given by the major technical schools. Subjects included in the 12-month welding technician's course train students for diverse occupations. For example, postgraduates of this course are now working as: shop method technicians, template makers, time-study men, estimators, salesmen, maintenance men, draftsmen, foremen, laboratory workers, production control specialists and control advisors.

As has been indicated earlier, the first six months of the course (Table

Table II. Welding Technician Curriculum

Twelve months (4 terms, 12 weeks each term)

TERM I	Periods per Week	Lecture	Lab.	Credit in Quarter Hours
Metallurgy	4	4	0	4
Metallurgy laboratory	3	0	3	1
Principles of electricity	3	3	0	3
D-c and a-c laboratory	3	0	3	1
Engineering drawing	3	0	3	1
English, rhetoric	3	3	0	3
Plane trigonometry	5	5	0	5
Slide rule	1	1	0	0
Totals	25	16	9	18
Advanced algebra (for some students)	5	5	0	0
TERM II				
Welding production methods	4	4	0	4
Welding production methods lab	3	0	3	1
Electrical welding machinery	4	4	0	4
Engineering drawing	6	0	6	2
English, basic composition	3	3	0	3
College algebra	5	5	0	5
Totals	25	16	9	19
TERM III				
Welding design	3	3	0	3
Production processes	3	3	0	3
Pressworking of metals	3	3	0	3
Applied psychology	3	3	0	3
Engineering drawing	6	0	6	2
English composition	3	3	0	3
Analytic geometry	5	5	0	5
Totals	26	20	6	22
TERM IV				
Non-ferrous welding	4	4	0	4
Non-ferrous welding laboratory	6	0	6	2
Welding metallurgy	5	5	0	5
English, business	3	3	0	3
*Industrial organization	4	4	0	4
**Technical selling	3	3	0	3
Totals	25	19	6	21
*Differential calculus	4	4	0	4
**Descriptive geometry	6	0	6	2

*Students may elect differential calculus to replace industrial organization.
**Students may elect descriptive geometry to replace technical selling.
Upon completion of this course, the graduate receives a Welding Technician Certificate. If he so desires, he may continue his study in the MSOE College of Electrical Engineering for an additional 24 months to obtain a Bachelor of Science degree, power major.

I) is complete in itself. It is devoted to training in welding—arc or gas—under the supervision of practical instructors.

Send Men Back to School

Evidence that the welding program is essential to Milwaukee's industries is demonstrated at the industrial classes that various Milwaukee manufacturers have held at the school. Two of Milwaukee's leading industrial plants have found it to their advantage to send employees to the Milwaukee School of Engineering for special instruction to augment their welding knowledge. Men thus trained become of greater value to themselves and to their employers. Besides its regular courses and the special clinic-type programs with individual plants, the Milwaukee School of Engineering has developed a welding class exposition and foreman training forum, both highly successful.

Welding Skills Are Vital

It is no exaggeration to say that our national future depends upon welding. At no other time in history has man become so dependent on a single fabricating process in so short a time. Naturally the ever increasing demand for welded products has created a demand for men who are technically skilled in welding. New metals and new processes are calling for new welding skills to keep abreast of the times. If you are looking for trained vocational workers or semiprofessional technicians, the graduates from the Milwaukee School of Engineering and other good schools throughout the country can certainly fill the job. Try them and see!

STEEL CASTING REPAIR

(Continued from page 29)

netic test or by X-ray inspection if the occasion warrants it.

Our experience would seem to indicate that there is less tendency for faulty welds to occur with submerged-arc welding than with conventional manual arc welding. Slag inclusions, some relatively large, are about the only defect we encounter with submerged-arc welding. This defect is easily picked up by the magnetic test and seems to occur with inexperienced operators for the most part.

Experimental and practical evidence seems to indicate that there are less welding stresses built up with submerged-arc welding than with conventional arc welding. We have also found that appreciably lower preheat temperatures can be tolerated with submerged-arc welding than with conventional arc welding. One of the most obvious advantages of submerged-arc welding is, of course, that the rate of metal deposition may be as much as five times that of conventional arc welding.

In conclusion, the addition of the new tool of submerged-arc welding to our repertoire of casting repair tools has resulted in a definite increase in the efficiency of the Everett foundry.

1—FLAME-CUTTING segment for cone top of reactor

2—FITTING-UP cone segments for reactor head plate

5—BEVELING edge of one section of the bottom head

6—POSITIONER aids welding of bottom head sections

Stainless-Steel Towers

BY E. N. ZIMMERMAN

CHICAGO BRIDGE & IRON CO. recently completed a big job of stainless-steel construction at its Birmingham, Ala., plant. This was the fabrication of three giant towers for the Grangemouth refinery of Scottish Oils, Limited, at Grangemouth, Scotland.

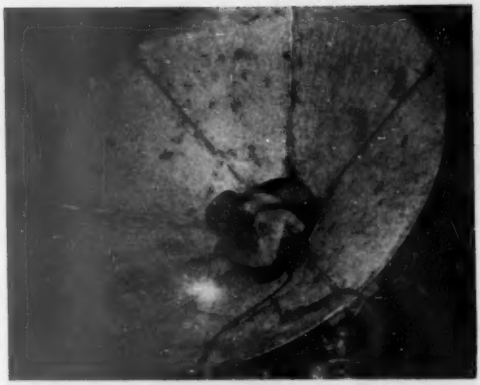
TWO REACTORS AND A CATCHPOT

Two of these vessels are phosphoric acid reactors 9 ft. 3 in. in diameter by 55 ft 5 in. high. The third vessel, called a "catchpot," is 8 ft 6 in. in diameter by 39 ft 4 in. high. The basic material for the three vessels is ASTM-A-240, Grade M, Type 316 stainless steel. Both reactors and catchpot were made by joining a cylindrical shell, formed of several rings, to a flanged and dished bottom and to a flanged conical top. Bottom and top heads were also weld-fabricated. The conical tops were each made in six segments.

The accompanying pictures offer a pictorial tour of the basic steps in fabricating one of the reactors. We'll start with the top cone. First, the stainless plate was laid flat on benches and marked for flame-cutting of the six segments. A powder-cutting process was used. Figure 1 shows a segment being flame-cut; it has the shape of a triangle with a circular base and the apex cut off. A plate planer beveled the edges for welding, after which the flat plate went to a press to be formed to the proper curvature by the application of dies and pressure.

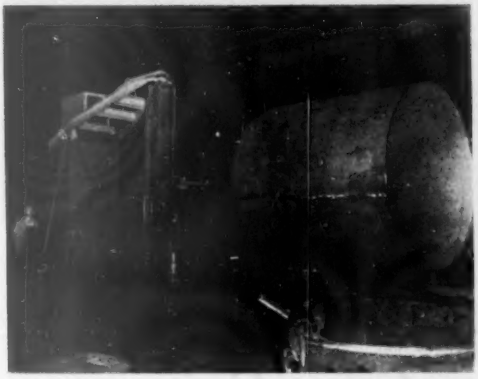
FITTING CONE SECTIONS

The six cone sections were fitted together (Fig. 2) and tack welded manually (Fig. 3). Tack welds were spaced about 6 in. apart. After tacking, the seams in the top head were welded with automatic submerged-arc equipment (Fig. 4), using 3/16-in. stainless welding wire. The welded cone then went to another large press to be flanged at the bottom for junction to the shell.

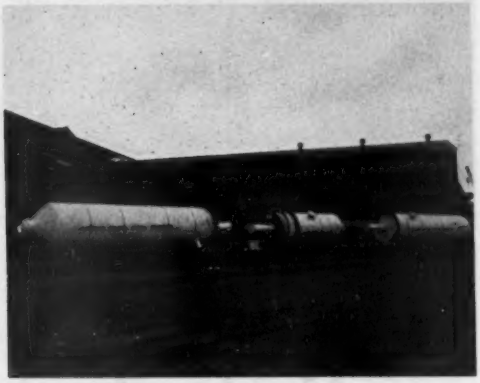


3—TACK WELDING of the cone top is done manually

4—SUBMERGED-ARC equipment finishes seams in top



7—X-RAY inspection of longitudinal weld in shell ring



8—REACTORS and catchpot (center) ready for shipment

for Scottish Oil Refinery

Bottom Head Plate

The bottom head was made from two sections, each flame-cut from plate to a semicircular shape. Clamps were attached to either end of the flame-cut plate to hold it during dishing. After the proper curvature had been attained, the edges were beveled by a flame-cutting machine (Fig. 5).

The two dished and beveled sections were fitted together and tack welded (Fig. 6), after which the seam was welded manually. A 14,000-lb positioner was used to hold the 9¼-ft head during tacking and arc welding.

As shown in Fig. 6, the welded plate had the shape of an enormous shallow bowl. It was bent down all the way around the edge on a flanging press for junction to the cylindrical shell.

Making the Shell

Each of the reactors had four shell rings. To make them, the first step was to bevel the edges of the flat plate on a plate planer, a machine that is used only for edge preparation. Each ring was then formed in one piece by bending a 29-ft length of plate into a ring of 9 ft 3 in. in diameter. There was thus only one longitudinal weld to make on each shell ring. The longitudinal welds were made from the outside by a submerged-arc welding head that was suspended on a platform above the big tube. The shell section stood still while the welding head traveled the length of the seam. Tabs were welded at either end to start and stop the submerged-arc weld.

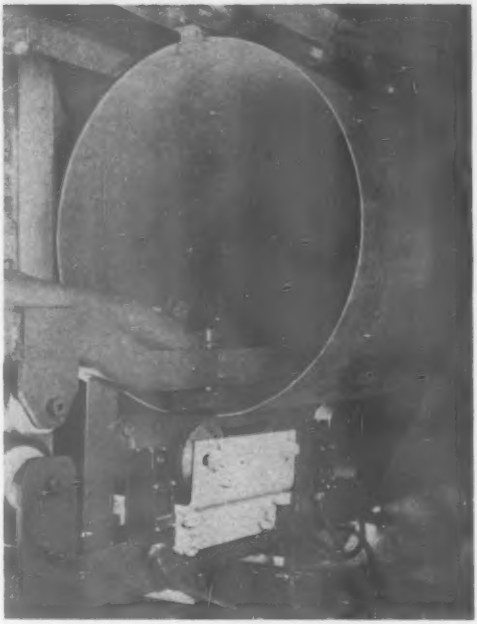
The circumferential welds that joined the rings together were made with the same type of submerged-arc equipment. In this case, however, the rings were revolved by turning rolls while the welding head remained stationary. Five circumferential welds had to be made in order to join the four shell rings to each other and to the top and bottom heads.

Before circumferential welding, the

(Continued on page 39)

Grit Blasting of Edges

1—SEVERAL PLATES may be grit blasted at a time, using a hand gun. All abrasive is captured and reused



2—FORMED PIPE edges as well as flat plates may be cleaned by grit blasting. One pass cleans both edges

Even on One-Time Jobs

Mechanization Cuts Costs

Grit blasting to clean plate edges, vacuum recovery and separation of flux, automatic or semiautomatic submerged-arc welding instead of manual welding . . . these methods save money for Thompson Pipe and Steel Co.

BY H. JACKSON
Plant Superintendent, Thompson Pipe and Steel Co.

ADMITTEDLY, the use of automatic welding is the way to speed up production and cut costs. The same people who advocate it, however, will tell you that automatic welding can't be done by the small shop because the expensive jigs and fixtures required are justified only by long production runs. You've heard that story, haven't you? Well, 'taint necessarily so.

Thompson Pipe and Steel, a Denver, Colo., firm, is far from being a large organization, nor do we have long production runs. Our plant employs only 160 persons, who are largely engaged in the fabrication of pipe, tanks, gates and similar water control equipment. We rarely have what might be considered a production run. In the fabrication of pipe, we are set up to produce any diameter of pipe from 6 to 123 in. and should the occasion arise we would make only a single pipe length. As for the tank end of our business, well, practically everything there is made up to the customer's individual order. So you can see how little opportunity there is for us to get geared for production.

YET WE ARE MECHANIZING

We are confronted with most of the so-called obstacles that preclude the use of automatic welding and other cost-saving devices. Hence we shouldn't be using such equipment at all, according to the experts. But we are—and are using it to good advantage.

We try to mechanize even the small jobs.

Our steps towards complete mechanization have been carried on in all phases. We not only try to do as much by automatic welding as is practicable, but we have mechanized our plate preparation methods and our flux recovery system. Perhaps, some authorities might say, we have gone too far with our mechanization but our an-

Automatic Welding

3—FIXTURE for grit blasting was built in Thompson's own shop. Note the ball castors that convey pipe

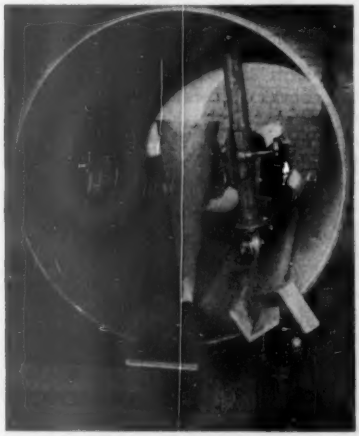
4—SUBMERGED-ARC welding equipment for outside seams. Used flux is cleaned and returned to the hopper

swers to such criticisms would be backed up by actual savings in dollars and cents.

To clean plate edges before welding, we have invested in some highly specialized equipment. This equipment was costly, but we feel that it will pay for itself over the period of its service life and bring us a good return on the investment.

Edges are now cleaned by grit blasting. Since we are only interested

Semiautomatic Welding



5—WELDING BACK-UP or inside seam. Angle at right is used as a guide rail

6—SEMIAUTOMATIC welding fixture from the side. The flux hopper is tilted horizontally to go inside a smaller-diameter pipe

7—FLAME-CUTTING TRACTOR is used with a radius arm to do semiautomatic welding along a curved seam

8—STRAIGHT-LINE semiautomatic welding is accomplished by using a channel section for the guide rail

in blasting the edges, the usual expensive blast chamber with conventional blasting equipment was out of the question. Instead we purchased a compact unit with a grit recovery system. This is suitable for doing the specialized job we require for the cleaning of plate edges, and it is possible to do the entire job in the shop area without special rooms or ventilating systems. Furthermore, we don't have to inconvenience our employees by forcing them to wear respirators. If and when necessary, this equipment may also be used to clean an entire weldment.

How We Blast Plate Edges

Fig. 1 pictures the manner in which the edges of flat plates are prepared for welding. The operator merely moves the combined blast nozzle and vacuum pick-up along the edge of the plate. The abrasive is directed on the work with tremendous force and then sucked up the hose along with the mill scale, dirt and other materials removed from the plate. We can clean the edges of several plates at the same time if the plates are stacked to "step back" the edges and expose them simultaneously.

By using this directed system, only the desired areas are cleaned. All the abrasive is captured and automatically cleaned for reuse, while the dirt removed from the plate is conveyed to a dust collector by the vacuum system. Is such equipment too expensive for a small shop? We don't think anything is too expensive that makes it possible for us to save money.

This efficient method of cleaning steps up production because less time is involved. It reduces costs—not only because it saves time and labor but by the almost complete elimination of "leakers." We found that most of our leakage trouble developed because unclean metal was being welded.

Another nice thing about our grit blasting system is the flexibility it affords. Merely by changing the nozzle, we can use the same basic equipment to clean the edges of a plate after it has been formed into a pipe section. Fig. 2 pictures the manner in which both edges of a longitudinal seam are cleaned in a single operation. Note how ball castors convey the pipe. Incidentally, we built this fixture in our own shop; anyone having welding facilities should be in a position to duplicate it. The overall unit is shown in Fig. 3.

No Beveling Necessary

One of the reasons why we use submerged-arc welding for fabricating pipe is that we can get good weld penetration without any other edge preparation than cleaning, on the majority of wall thicknesses we handle. Welding costs go up rapidly when it is necessary to bevel the edges for welding. You can appreciate the cost saving when I tell you that we do not bevel ¼ in. or even ⅜ in. plate prior to welding. Besides this big advantage, the submerged-arc process also speeds up welding considerably.

Figure 4 pictures the equipment that welds the outside longitudinal seams. In order to reclaim the unfused flux after welding, we have equipped this machine with a "vacuum cleaner" flux recovery. This unit not only salvages the flux but provides a means of separating harmful flux "flour" from the flux that can be reused. The clean flux is fed into a hopper and subsequently flows back to the weld.

To some, this flux recovery unit might seem like a needless expense. However, it pays its own way as we can salvage valuable flux more effectively and efficiently than could ever be accomplished by manual means. The salvaged flux is prepared for reuse without any trouble on our part. This represents an overall saving of costly man-hours. Welding is speeded up, too.

"Squirt Gun" Welding

We use semiautomatic welding to back up outside longitudinal submerged-arc welds. This definitely affords an advantage in our shop. Figure 5 shows the semiautomatic or "squirt gun" welder making the back-up weld on a 24-in. pipe of ⅜-in. wall thickness. The outside longitudinal weld on this pipe was made at the rate of 16 ipm, using a 3/16-in. wire and 750 amp at 32 volts. The inside weld is likewise made at 16 ipm, but a 5/64-in. wire is used with 450 amp at 40 volts. The conical flux container is kept filled by hand with the same granular flux that is used for the outside submerged-arc weld.

A slight modification of the flux hopper and guiding arrangement makes it possible to weld the inside seam of a pipe as small as 6 in. in diameter with the same semiauto-

matic welding unit. The guiding arrangement is an excellent example of the ingenuity that can be found in a welding shop. Fig. 6 shows the welding-head boom with hopper in a nearly horizontal position to fit inside small pipes. The entire boom is mounted on a flame-cutting tractor so as to obtain uniform welding at the desired speed.

The boom holding the flux hopper and wire-feed unit is self-supporting. An angle guide assures alignment of the wire and flux with the seam.

Even if these shop-built units have the appearance of Rube Goldberg creations in some respects, they most certainly serve their purpose, which is to save us money. We could have made them look prettier, but we are more interested in reducing costs than in artistic design.

Welding in a Semicircle

In Fig. 7, you can see how our shop employed semiautomatic welding to build up a box beam for a hydraulic press. A radius weld is being made on 1-in. plate. The radius arm has been centered on temporary blocking to guide the flame-cutting tractor carrying the welding head. Because of the limited area in which the tractor can operate, it was necessary to "reverse" after half the weld had been made. Thus we started at one end of the arc and went to the center. Then we turned the semiautomatic welding head and flux hopper the other way around and began again at the opposite end of the arc, once more welding to the center to complete the seam.

The mere fact that this semiautomatic welding unit is used for welding on a curve does not prevent its use for straight-line operations on the same semiautomatic basis. Figure 8 pictures the manner in which a straight-line weld was made on the same press beam. The flame-cutting tractor was simply disconnected from the radius arm and placed on a channel section so that the flanges became rails to guide the tractor. The only precaution necessary was to make sure that the channel exactly paralleled the seam. Once the channel was in alignment, all that was necessary was to start up the welding operation and start the tractor. Everything else was done automatically.

The building of this beam is an excellent example of how semiautomatic welding may be used for a one-time welding job. Building presses will never be a part of our production system, yet we found it much more economical to use a semiautomatic welder than to do it manually.

It Saves Us Money

We at Thompson Pipe and Steel have found that welding is the only way to fabricate metals. We likewise found that the savings possible through the use of mechanization are limited only by our ingenuity in devising ways to use automatic and semiautomatic equipment.

SCOTTISH REFINERY TOWERS

(Continued from page 35)

longitudinal weld of each shell ring was inspected by means of a 250,000-volt X-ray machine (Fig. 7). Defective areas were chipped out and rewelded. Circumferential welds were also X-ray inspected with the same equipment.

The shell plate of the reactors was $\frac{3}{8}$ in. thick, the bottom head $\frac{3}{4}$ in. (minimum thickness allowed after dishing) and the six-piece top $\frac{1}{2}$ in. (minimum thickness). Surmounting the conical top of each reactor tower is a flanged and dished head 30 in. in diameter. Unlike the main body, these smaller heads are not stainless steel but were formed of ASTM-A-285, Grade C, Firebox Steel. Perforated grid plates and miscellaneous parts inside the reactor are of solid nickel.

Hastelloy-Lined Leg

Protruding from the bottom of each vessel is a "leg" 2 ft in diameter by 8 ft long. This 8-ft tube is formed of 5/16-in. stainless steel and has an inner shell of 3/16-in. Hastelloy. Manual arc welding was used for the Hastelloy, and the welding had to be done in more than one pass. Some of the shell connections are stainless steel, some nickel, some Hastelloy and others are made of ASTM-A-181, Grade I, forged steel with nickel linings.

All of the body welding on both reactors and catchpot was done with 3/16-in. stainless electrodes. Tack welds were spaced approximately 6 in. apart.

Catchpot Construction

Though the catchpot was made of the same basic material (stainless steel) as the reactors, the plate thicknesses differed. The shell of the catchpot was made of 5/16-in. plate, the bottom head of $\frac{1}{2}$-in. plate (minimum thickness allowed after dishing) and the six-piece conical top of 7/16-in. plate (minimum thickness). There were three shell rings. Four circumferential joints were made to join the shell rings to each other and to the top and bottom heads.

In most respects, the construction of the catchpot was very similar to that of the reactors.

Extending from the bottom of the catchpot is a leg 2 ft in diameter by 8 ft long. Instead of an inner shell of Hastelloy, as is the case with the reactor legs, the catchpot leg has an inner shell of 3/16-in. nickel. The shell connections are nickel, stainless steel and ASTM-A-181, Grade I, forged steel.

Asbestos-filled nickel gaskets were furnished for all flanged openings on the three vessels.

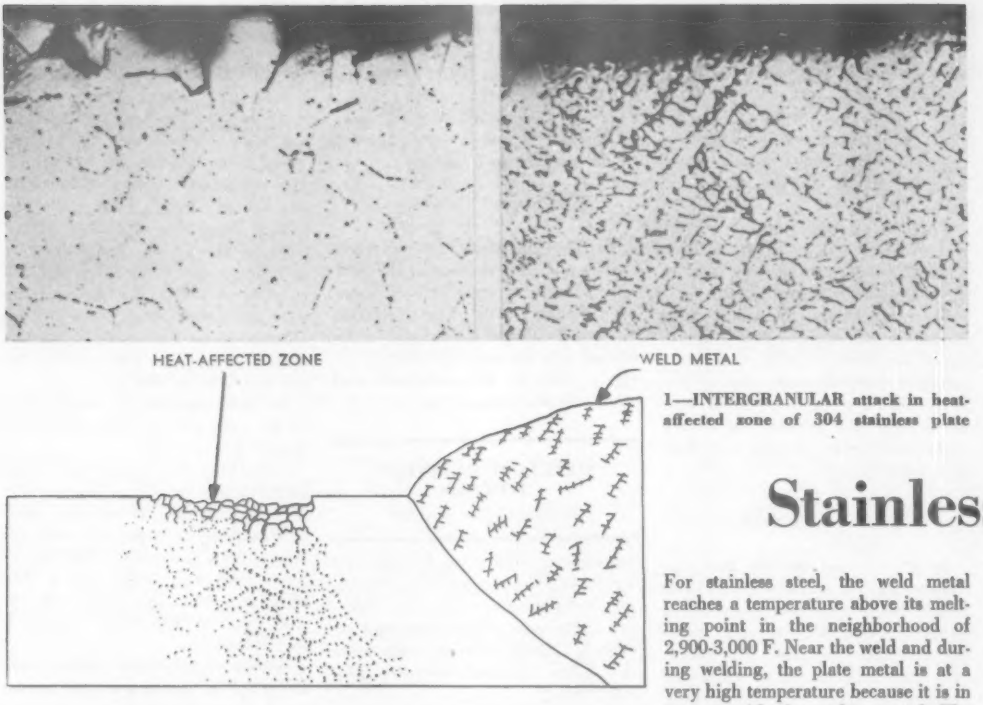
Completed reactors and catchpot, loaded for shipment from Birmingham, are shown in Fig. 8. The reactors are the long towers at either end; the catchpot the shorter vessel in the center of the illustration.

New-Type Alloy Steels Stretch Restricted Metals

New alloy steels employing very small quantities of restricted alloying elements have been announced by the Technical Committee on Alloy Steel of American Iron and Steel Institute. They are even leaner in alloy content than the old NE steels (see page 49).

Of the two new series of steels, one contains an average of 0.25% chromium and the other 0.43%. Both series contain an average of 0.30% nickel and 0.12% molybdenum. The National Emergency steels of World War II contained nearly twice these quantities of critical elements.

The new steels are treated with a non-critical alloy containing boron, of which the United States has unlimited supplies. Boron acts to increase the hardenability of a steel under heat treatment.



1—INTERGRANULAR attack in heat-affected zone of 304 stainless plate

Stainless

BY RICHARD K. LEE

Vice-president in Charge of Research, Alloy Rods Co., York, Pa.

COLUMBIUM is added to stainless steel (chrome-nickel) for the purpose of preventing intergranular corrosion in the heat-affected zone. It has been especially necessary to add columbium, or in some instances titanium, when the weldment could not be annealed after welding or when the weldment was to be used in a service temperature range of 800-1,500 F.

COLUMBIUM IS CRITICAL

Today, the United States government has declared columbium to be in short supply and has placed it on the critical list of strategic materials. You can't get columbium today unless you need it for the manufacture of aircraft or other defense products.

Titanium has characteristics similar to columbium and could, on most weldments, be substituted in the plate metal. Unfortunately, titanium cannot be substituted for columbium in welding electrodes because it is easily oxidized and very small quantities are recovered in the weld metal after transfer across the arc.

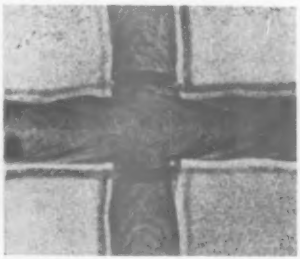
THEN WHAT SHALL WE DO?

It is the purpose of this article to tell just why columbium is needed in the welding of stainless steel and to discuss a method of getting along without it. Let's go way back to fundamentals.

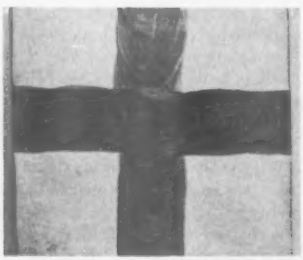
The success of arc welding depends upon sufficient heat to fuse both plate and weld metal into one integral part.

For stainless steel, the weld metal reaches a temperature above its melting point in the neighborhood of 2,900-3,000 F. Near the weld and during welding, the plate metal is at a very high temperature because it is in contact with the molten metal. The plate metal near the weld reaches a temperature just below melting—2,600-2-700 F.

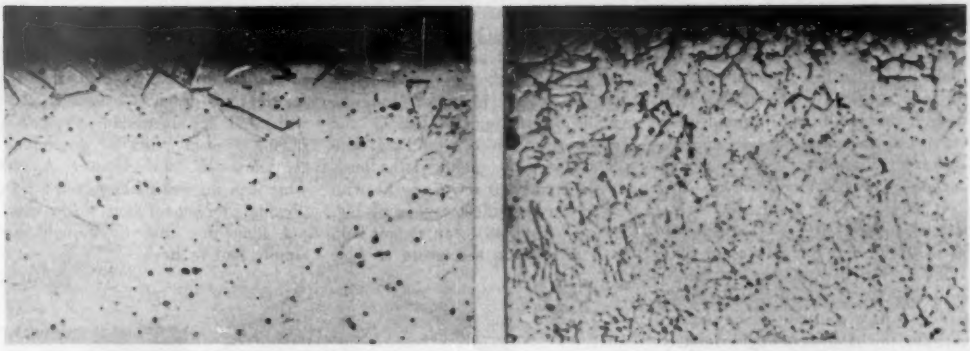
Chrome-nickel stainless steel has very poor thermal conductivity. As compared to carbon steel, it takes so much longer to carry away and dissipate the heat of the weld metal that a very sharp temperature difference exists in the work. Most of the heat from the weld metal is confined to a narrow band or zone a short distance from the weld metal, where it stays for a relatively long period of time.



2—DARK BANDS are due to carbide precipitation in welded 304 plate



3—COLUMBIUM-stabilized plate and electrodes: no carbide precipitation



7—ELC PLATE shows no intergranular corrosion in heat-affected zone

Welded without Columbium

This zone, which ranges from 800 to 1,500 F in temperature, is commonly known as the "heat-affected" zone. As proof of the slow dissipation of the welding heat, the weldor can place his finger within an inch of a stainless-steel weld immediately after he has completed it. It would mean a burned finger if he tried to do the same on plain carbon steel.

Intergranular Corrosion

When austenitic stainless steels are heated to the temperature range of 800-1,500 F and held for any appreciable period of time at that temperature, chromium carbide precipitates at the grain boundaries. Let's look at a micrograph of type 304 plate metal and type 308 weld metal in the as-welded condition. Anyone can see the intergranular corrosive attack in the heat-affected zone of Fig. 1. In this micrograph, the etchant was a 10% sodium cyanide solution, and the magnification was 250X.

The formation of chromium carbide results in a depletion of chromium at the grain boundaries, with resultant failure of the plate when used in critical corrosive service. Note the dark bands of corrosion due to carbide precipitation in the heat-affected zone of Fig. 2. This butt weld in ½-in. type 304 plate was made with type 308 electrodes. The etchant was a solution of 10% nitric, 3% hydrofluoric acid, and etching was carried on for 12 hours at 175 F. The same etchant and etching treatment was used for the welds pictured in Figs. 3, 4, 5 and 6. All of these five macrographs are actual size.

The addition of either columbium or titanium will inhibit or prevent the formation of chromium carbide because both of these elements have a greater affinity for carbon than chromium has. The preferential formation of either columbium carbide or titanium carbide then leaves the chromium free to go about its business of resisting corrosion. Note the absence of corrosion in the heat-affected zones of Fig. 3. This butt weld was made in ½-in. columbium-stabilized type 347 stainless plate welded with type 347 electrodes.

But No Columbium

Unfortunately, columbium is in

4—ELC plate and electrodes likewise show no carbide precipitation

5—BUTT WELD in columbium-stabilized plate made with ELC electrodes

6—TITANIUM-stabilized plate (321) welded with type 308 ELC electrodes

short supply and titanium-stabilized welding electrodes cannot be substituted, as we have previously explained. Under these conditions, the obvious answer to the problem of carbide precipitation is to remove the carbon. No carbon, no carbon precipitation. Of course, but how much carbon is it necessary to remove?

It has long been known that up to 0.02% carbon will remain in solution in austenite at temperatures of 800-1,500 F. For example, in a stainless steel containing 0.07% carbon, only 0.05% will precipitate as chromium carbide; the balance, of approximately 0.02%, remains in solid solution. Carbon contents of 0.02% maximum are not practicable for steel mills to produce. However, the only slightly greater carbon content of 0.03% maximum is, for all practical purposes, low enough to prevent appreciable carbide precipitation after short-time exposure to temperatures of 800-1,500 F.

These extra-low-carbon stainless steels (maximum carbon content of only 0.03%) have been under test and development by several steel mills since 1945. Many weldments have been in successful operation since 1948 in a wide variety of industrial applications.*

Fig. 4 shows a butt weld in ½-in. type 304 ELC (extra-low-carbon) plate, welded with type 308 ELC electrodes. There is the same absence of corrosion in the heat-affected zones that was shown in Fig. 3, where, remember, columbium was used in both the plate and the electrode.

Versatility of Electrodes

ELC electrodes may be used successfully to weld columbium-stabilized (type 347) or titanium-stabilized (type 321) plates as well as ELC plate. Type 316 ELC electrodes are also available for welding type 316 ELC plate and type 318 plate (316 columbium-stabilized).

Figs. 5 and 6 are butt welds in ½-in. stainless plates. In Fig. 5, type 347 plate was welded with type 308 ELC electrodes. In Fig. 6, type 321 plate was welded with type 308 ELC electrodes. No zones of corrosive attack are present in either of these two weldments, and the same resistance to corrosion is shown as in Fig. 3.

*As an example of an industrial application see article, "ELC Stainless for Pulp Mill Duct System," The Welding Engineer, Dec., 1950, page 30.

To conclude this discussion, Fig. 7, another micrograph, shows type 304 ELC plate metal and type 308 ELC weld metal in the as-welded condition. The etchant was a 10% sodium cyanide electrolyte (as in Fig. 1), and the magnification was 250X. If you will compare the photo of the heat-affected zone (left on page 41) with that of the heat-affected zone of Fig. 1 (left on page 40), you cannot help but remark upon the entire absence of any intergranular corrosive attack in the heat-affected zone of Fig. 7.

The author wishes to express appreciation to the Armco Steel Corp. for the photographs reproduced herewith and for invaluable assistance during several years of developing the new ELC electrodes. Again, American ingenuity has solved a perplexing problem of how to do without something that we thought we simply had to have.

Be a Better Listener

No. 10 in a series of inspirational talks on "Twelve Self-Assignments to Sales Success"

BY RICHARD C. BORDEN

THIS MONTH endeavor to be a good listener and questioner in your sales work . . . as well as a good talker.

Strive particularly to make LISTENING a fine art.

Every time one of your customers opens his mouth . . . even if only to voice an objection . . . give him the surprise of his life.

Look at him with rapt intentness.

Don't interrupt. Don't even act as if you *wanted* to interrupt.

Instead, LISTEN! And, as you listen, do so appreciatively . . . rather than with an impatient gleam in your eye that implies:

"Will this guy ever pipe down and let a smart man talk?"

As your listening skill improves during the month of this self assignment, you will discover that customers, as never before, are taking the wind out of their own objections . . . disclosing to you their "moose calls" . . . revealing to you their most pressing job problems . . . tipping you off, frankly and explicitly, on just what benefit buttons you should press in order to land their business.

In your endeavor to be a better listener this month, don't let yourself be flabbergasted by the occasional close-mouthed customer who seems unwilling to do more than just grunt.

Usually the customer who "just grunts" does so because *that's all you gave him opportunity to do.*

True, every time you completed a benefit chapter of your sales story, you asked how your customer evaluated that particular feature of your product.

But did you then LISTEN? Did you wait long enough for your customer to formulate his answer so that you COULD listen?

Don't let a few seconds of silence scare you out of winning the interview guidance you need.

After you ask for a customer reaction, *wait* for it. Sit quietly in your chair and *keep* waiting. Wait as long as necessary!

The worst mistake you can make is to let customer slowness in replying panic you into garrulous resumption of your own sales monologue, no matter how good your voice sounds.

Next time you find yourself dealing with a customer who only grunts, recall the story of the garrulous woman who after a dinner party complained about the behavior of one of her husband's guests.

"What a bore!" she snorted. "All during my conversation he kept yawning."

To which her husband replied: "Are you quite sure he was *yawning*, dear? Maybe he was only trying to say something!"

These articles, published every month in THE WELDING ENGINEER, are based on the script of a Dartnell-Borden series of sales films, "Selling against Resistance."

Do LIGHT or MEDIUM WELDING and CUTTING?

Don't miss . . .

K-G's *New* E50 COMBINATION

E50 Welding Torch with EUS #4 Tip Only 14 3/4", 18 oz.!

EA50 Attachment with Cutting Tip, E50 Torch Only 16 1/4", 32 oz.!

LIGHT, COMPACT, WELL BALANCED—

A "Natural" for Light and Medium Gauge Work: Sheet Metal, Silver Soldering, Pipe Welding, Etc.

ONE QUICK EXAMINATION of this versatile new combination often "sells" it! Look over its beautiful finish, fine materials, and careful construction—and you get an idea of its durability. Heft the torches' superb balance, try their easy-working valves—and you see why they speed production.

THE E50 WELDING TORCH handles brazing and welding jobs up to ½". Its 9 one-piece swaged EUS tips — ranging from 00 to 8 (drill sizes 75 to 40) — produce a soft, even flame. A universal mixer assembly (now fluted for hand tightening) accommodates all 9 tips. Widely spaced needle valve handles are easy to adjust with gloved hands — hold constant adjustment. Tough, durable — every part is either forged or fabricated from bar or tube stock, and all joints subject to heat are silver soldered.

THE EA50 CUTTING ATTACHMENT takes tip sizes 0 to 4 (drill sizes 68 to 45), handles cutting jobs up to 3". It features: forged high pressure body, forged head, nickel silver tubes, silver brazed joints. Its mixer nut is now fluted for hand tightening. "O" ring principle high pressure mechanism prevents gas leakage—flashback resistance is equal to that of K-G's famous M38 Cutting Torch.

Also see the NEW K50 COMBINATION

A general purpose welding and cutting torch handling tip sizes from the lightest to the heaviest.

To SEE the new E50, get in touch with your K-G Distributor, or write to

THE K-G EQUIPMENT COMPANY, (Inc.)

515 West 29th St., New York 1, N. Y.

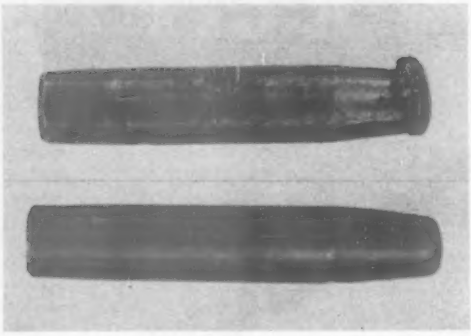
Sold in Canada under the name "WELDCO" by Welding and Supplies Co., Ltd., Montreal and Toronto

K-G

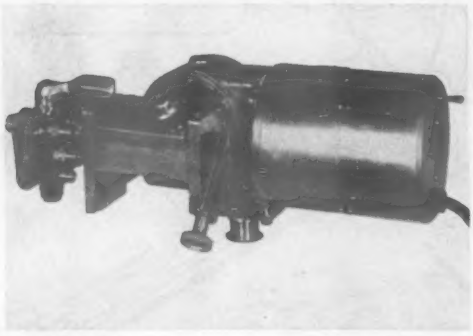
A UNIT OF Air Products INC. OXYGEN GENERATING EQUIPMENT

K-G . . . Since 1914, symbol of satisfaction on GAS WELDING AND CUTTING EQUIPMENT

New products



BEAT-UP electrodes (top) don't have to be junked. Silver brazed replacement tips give 30,000 more spots



METALLIZING GUN is designed for spraying from lathe mounting. It sprays 80 lb of zinc per hour

New Tips on Old Electrodes Conserve Copper

SUBSTANTIALLY added service life for spot-welding electrodes is claimed for a new replacement tip process. Called "Nu-Tip", the operation utilizes a special silver solder that provides a bond of high melting point, high strength and low electrical resistance. Loss of electrode hardness due to brazing is held to a low limit, says the company.

In comprehensive offset welding tests, "Nu-Tip" electrodes have run 30,000 welds and have withstood repeated applications of 2,000 lb. of force at an angle of 30 deg. The replacement tips employ the Mallory fluted water hole for effective cooling.

These electrodes are not the equivalent of new ones, reminds the company, but should provide much usable welding time from electrodes that would otherwise be scrapped.

P. R. MALLORY & CO., INC., 3029 East Washington St., Indianapolis 6, Ind.

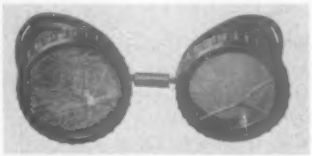
* * *

Brazing Compounds Supplied to Customer's Order

FOR improved induction and furnace brazing, manufacturers may now order ground bronze in 2 specified mesh sizes and pre-mixed with flux. The mixture, called "All-State No. 45 Brazing Compound" (specified mesh), is a light gray powder that is to be mixed with water before application. It flows at about 1,800 F to produce a smooth, thin yellow alloy with fillets of similar size to those of silver solder. It develops a shear strength of 80,000 psi, according to the manufacturer.

ALL-STATE WELDING ALLOYS CO., INC., 273 Ferris Ave., White Plains, N. Y.

* * *



All-Plastic Goggles Resist High Impact

SEVERE impacts will only fracture the "Rexlite" all-plastic goggle lens (right above), not shatter or splinter it (left above). Welding spatter or bits of grit from grinding operations cannot damage the surface, claims the manufacturer.

For weldors and flame-cutting operators, the "Acelite" cover lens is recommended. For chippers and grinders, the "Rexlite" lens serves efficiently. Both lenses are of an optical-quality plastic that transmits light without distortion. Size for size, the plastic lens has less than half the weight of optical glass and is not as likely to fog up as glass either, says the maker.

THE GOGGLE PARTS CO., 1468 West Ninth St., Cleveland 13.

Metallizing Gun Built for Lathe-Use

FOR rapidly and efficiently metal spraying shafts, rolls or machine parts, the "Mogulectric" metallizing gun was designed to fit on a lathe. It has a higher spraying speed than former models, depositing up to 18 lb per hour of aluminum and nickel and up to 80 lb per hour of zinc.

Weight of the gun is 20 lb, including a 1/20 hp constant-speed induction motor that feeds the metal wire at a uniform rate. This drive is said to speed a spraying job by one-half to two-thirds.

Gas consumption is said to be economical, i. e. when spraying 3/16 in. stainless steel wire, the "Mogulectric" uses 44 cu ft of acetylene and 68 cu ft of oxygen per hour. The air used to atomize and carry the molten metal to the work surface is used at the rate of 16 cu ft per minute at 45 psi.

METALLIZING COMPANY OF AMERICA, 5520 West Carroll Ave., Chicago 24.

* * *

Pressurized Extinguisher Puts out Magnesium Fires

A NEW type of dry powder under pressure is an extinguisher, fuses and forms an air-excluding crust over the burning metal to choke out a fire. It is claimed to be effective in putting out fires in magnesium, sodium, potassium, zinc, powdered aluminum.

ANSUL CHEMICAL CO., Marinette, Wis.

for welding

April showers of New Products bring replacement tips for worn spot welding electrodes, a new metallizing gun and a rectified welder.

Selenium Rectifier Welder Has Easy-Start Device

Two exclusive features are offered in the new Miller selenium rectifier d-c welders. First, an arc-start surge device provides high current for easy striking of the arc. Second, a new type of current control makes possible remote control operation.

The welders come in two current ranges—40 to 250 amp and 60 to 375 amp. They have no moving parts. Less floor space is required because of the upright design. Lifting hooks on the side of the welder aid moving with overhead hoists.

The amperage indicator is located on the front of the welder. Standard input power requirement is 220/440 volt, three-phase, 60-cycle current. The knob-type current control and "off and on" switch are also on the front panel. These welders can be used for inert-gas-shielded welding and can also be paralleled to provide high currents.

Miller Electric Mfg. Co., Appleton, Wis.

* * *

New Electrode Leaves Small Weld Deposit

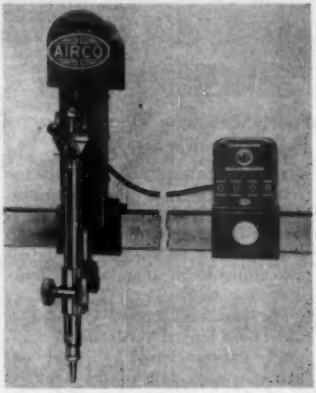
Outstanding feature of the new P&H DH-4 welding electrode is its penetration action and consequent solid fusion. It leaves a small deposit of weld metal so that the joint consists mainly of fused parent metal.

Extremely heavy sections can be economically welded with this new electrode, the company claims. With both a-c and d-c, it will make horizontal fillet welds, good vertical down welds, gouge out cracked and faulty welds and cut stainless, mild steel, manganese steel, bronze, aluminum and cast iron.

It comes in three sizes, 1/8 in. for use at 300 amps, 5/32-in. for 400 amps and 3/16-in. for 450-500 amp.

Harnischfeger Corp., Welding Div., Milwaukee 14.

* * *



Motorized Torch Holder Speeds Flame-Cutting

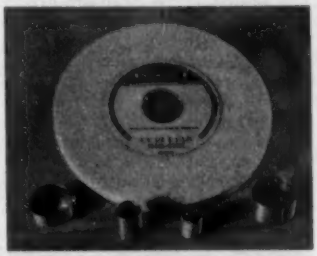
Fast positioning of the cutting torch above the workpiece is possible with the new Airco motorized torch holder. It mounts on the 3-in. square torch bar of the Airco "Oxygraph" or "Travograph" to raise or lower the torch through 5 in.

As many as four torches can be controlled individually from a remote control switch box at the operator's station. A master switch moves all torches simultaneously. For each four additional torches on a machine, another box is added.

This holder can be positioned vertically, 90-deg left or right parallel to the longitudinal axis of the torch bar. With an adaptor, it can be positioned 90-deg forward perpendicular to the horizontal axis of the bar.

Air Reduction Sales Co., 60 East 42nd St., New York City 17.

* * *



Grinding Wheels Mount Easy with Precision Bushings

New patented precision bushings for Norton grinding wheels are claimed to improve performance in several ways. The light weight of the bushing and its uniform size preserve the inherent balance of new Norton wheels. Since the hole size is more consistent, the user has uniform mounting conditions. The press-fit method of mounting the bushing in the wheel insures greater holding power of the bushing within the wheel. At the present time the bushing is used in Norton straight wheels 5 to 8 in. in diameter.

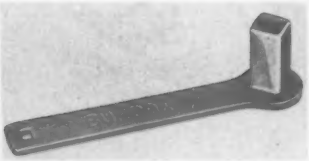
Norton Co., New Bond St., Worcester 6, Mass.

* * *

Plier-Type Clamp Works with One Hand

New fast-acting plier-type toggle clamp, "De-Sta-Co" No. 424, features compactness and light weight. Its one-hand action and 4½-in. overall length make it useful in tight or cramped places on aircraft jigs, sheet-metal holding fixtures, etc. Handles and jaws are forged high-alloy steel.

Detroit Stamping Co., 372 Midland Avenue, Detroit 3.

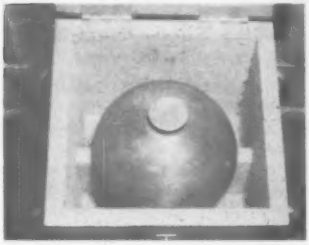


Cylinder Valve Key Aids Acetylene Users

NINE features make a new cylinder valve key for acetylene cylinders useful to weldors, maintenance men and other users of compressed gases. The all-steel key is hydrogen brazed and has extra length for more leverage. Its design is said to be more comfortable to the hand. It not only fits all sizes of acetylene cylinders but fits recessed shanks firmly. In addition, it fits 20-lb propane cylinder valves and other cylinder valves with $\frac{3}{8}$-in. square stems.

THE BURDETT OXYGEN CO., 3300 Lakeside Ave., Cleveland 14.

* * *



Storage-Shipping Container for Cobalt-60 Isotope

TWO sizes of containers are available for easy handling and shipping of radioactive cobalt, now being used in industrial radiographic inspection (See THE WELDING ENGINEER, page 24, Dec., 1950).

The container consists of a solid lead ball, 9-in. in diameter in one size and 12-in. in the other, mounted inside a strongly built wooden box. Weight of the small box is about 200 lb. The other weighs 300 lb.

The cavity in the center of either ball is just large enough to hold the $\frac{1}{2}$ by $\frac{3}{4}$ in. aluminum capsule that contains the Cobalt-60. A solid lead plug with an overlapping top closes the cavity. For handling the plug, a pair of tongs is furnished.

ST. JOHN X-RAY LABORATORY, Califon, N. J.

* * *

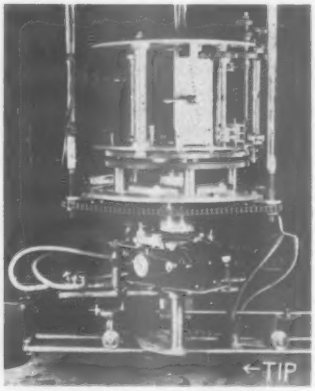
Hard-Facing Rod For Oxyacetylene

A NEW oxyacetylene applied welding rod provides hard-facing protection against medium impact and high abrasion. Known as "Wear-Flame 40" it is a centrifugally cast rod of wear-resistant chromium carbides in a hard iron chromium, manganese alloy matrix.

Hardness of the deposit is said to be retained at relatively high temperatures. The Rockwell C rating of the deposited metal is 56-58, claims the company. The rods come in $\frac{1}{8}$-in. diameter at various lengths: 5/32 to $\frac{3}{8}$-in. diameters in 14-in. lengths.

ALLOY RODS CO., 6005 West Market St., York, Pa.

* * *



Special Machine Flame-Cuts Big Steel Sprockets

A sprocket-cutting machine utilizing oxyacetylene torches produces sprockets from steel plate 1 to 6 in. thick. Instead of a tracing device, a motor-driven clockwork mechanism guides the cutting torch about the contours of the sprocket.

The machine consists of a 20-ft steel boom hinged vertically to a 12-ft steel mast anchored in 4 ft of concrete. On each side of the boom is a rail. Along these two parallel rails, the cutter rolls the full length of the boom.

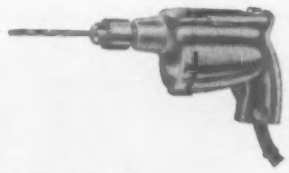
The machine is held in position for a certain size of sprocket by a spring-loaded center point resting in a centerpunch mark in the steel plate. The sprocket shape is produced by varying the speed of rotation of the cutting machine about the center point while a cam moves the torch toward and away from the center point.

A 1/20-hp electric motor drives the clockwork mechanism. The clockwork actuates the input pulley of a "vari-drive" that makes a smooth continuous variation in the speed of the cutting torch.

Capacity of the machine ranges from diameters of 1 ft or less to more than 5 ft, plate thicknesses up to 6 in. A 15-tooth sprocket of 1 ft diameter can be cut from $\frac{3}{4}$-in. steel in 6 minutes. Cutting surfaces are said to be so smooth that for many applications no further finishing is needed.

THE IDAHO SPROCKET AND MACHINE WORKS, Boise, Idaho.

* * *



Portable Tool Grinds and Drills

NEW "Desoutter" portable electric tool turns grinding wheels, drills, rotary files, polishing and sanding discs. Its weight is $2\frac{1}{2}$ lb, and it will take shanks up to $\frac{1}{4}$ in. Model S2 operates at a free speed of 1,600 rpm on a-c and d-c supplies. Its power consumption is said to be 180 watts.

The motor has an accurately balanced armature that runs on preloaded ball bearing. The tool has a Jacobs key chuck and comes with a decarbonizing and cleaning kit. A drill stand and bench clamp are available as extra equipment.

NEWAGE INTERNATIONAL, INC., 235 East 42nd St., New York 17.

* * *

NEW PRODUCT BRIEFS

Job-ticket envelopes made of 0.005-in. thick plastic protect work orders, blueprints and shop cards from grease and grime. Strap hangers, grommets and special backings can be added at small expense. American Kleer-Vu Plastics, Inc., 58 Thames St., Brooklyn 6.

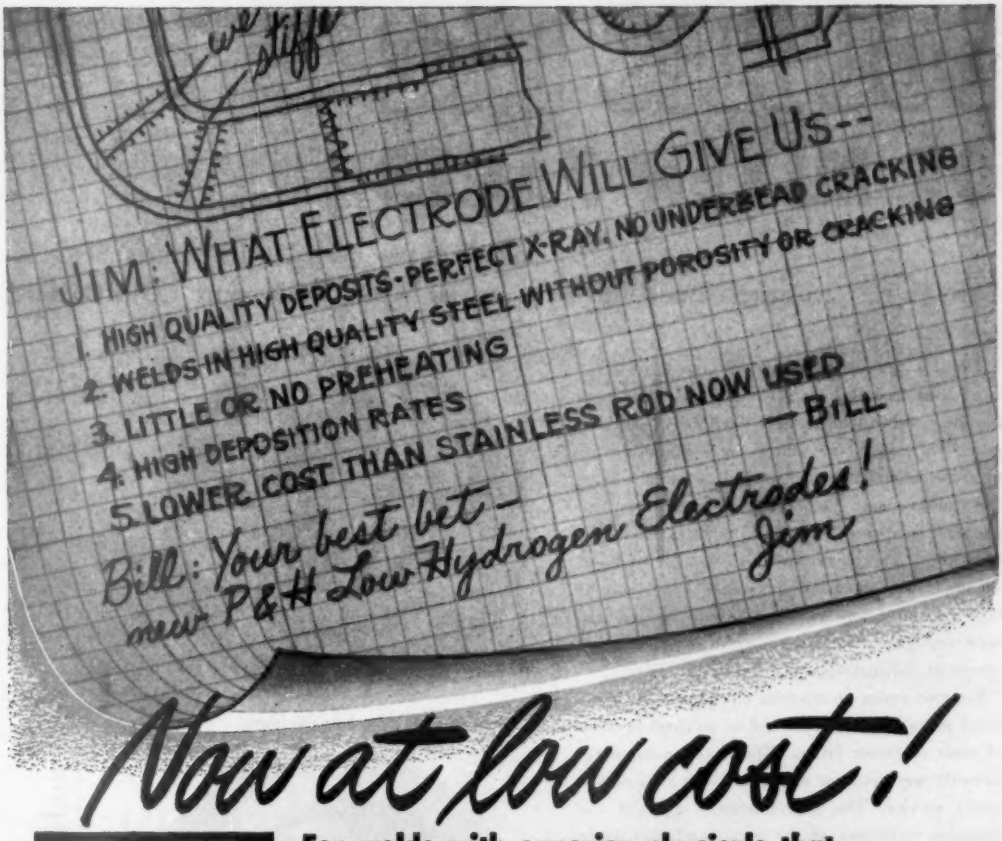
* * *

Channel marking machine stamps deep-clear-cut letters in aluminum or other metal channels. It uses a roll die that can be provided with interchangeable type set-ups. M. E. Cunningham Co., 89 East Carson St., Pittsburgh 19.

* * *

Air safety valve that works even if air or electrical supply is interrupted utilizes a clapper-type solenoid. In addition, all springs are eliminated. Ross Operating Valve Co., 120 East Golden Gate, Detroit 3.

(Continued on page 92)


we stiffe
JIM: WHAT ELECTRODE WILL GIVE US--
1. HIGH QUALITY DEPOSITS-PERFECT X-RAY, NO UNDERBEAD CRACKING
2. WELDS IN HIGH QUALITY STEEL WITHOUT POROSITY OR CRACKING
3. LITTLE OR NO PREHEATING
4. HIGH DEPOSITION RATES
5. LOWER COST THAN STAINLESS ROD NOW USED
—BILL
Bill: Your best bet—
new P&H Low Hydrogen Electrodes!
Jim

Now at low cost!

P&H

For welds with superior physicals that match special steels, simplify production — —

LOW HYDROGEN ELECTRODES

Here's the world's most complete line of low hydrogen electrodes — 14 types to choose from.

Operators prefer them because of their easy manipulation, easy slag removal, smoother deposit, low spatter loss, fast deposit rate, good penetration, and less smoke.

Manufacturers prefer them too. They have fewer rejections. Smaller welds for faster production. Fewer types of rods to buy, stock, and supervise. They eliminate trouble with off-analysis steel.

Simplify your welding procedures. Standardize on P&H Low Hydrogen Electrodes. Your costs are lower, your welds better and stronger.

P&H WELDING DIVISION
4513 W. National Ave.
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

2255

Here are a few of the money-saving P&H Low Hydrogen Electrodes:

- *For problem steels:* High carbon, high sulphur, cold-rolled alloy . . . 70LA and 70LA-2.
- *For steel castings repair;* matches analysis and heat-treating properties of Grade B castings . . . P&H .25C.
- *For steel castings repair;* matches heat treating properties of Grade B castings . . . 70LB.
- *For welding nickel-alloy steels;* gives high impact resistance at low temperatures . . . 75LP.
- *For Chrome-moly steels* (1¼ Cr., ½% Mo.) used in power piping . . . 80LE.
- *For Chrome-moly steels* (2¼ Cr., 1% Mo.) used in power piping . . . 90LE.
- *To match heat-treating properties of SAE 1040* and like steels. Also for steel-castings repair . . . P&H .40C.
- *For welding high hardenable steels.* Also steel castings repair . . . AW2B.
- *For repair welding Grade C castings* and steels of similar composition . . . P&H-7.
- *Comparable to SAE 8630 steel* . . . excellent heat-treating and flame-hardening characteristics . . . 80LH-2.
- *For welding high hardenable steels* without pre-heat such as re-rolled rail stock . . . P&H-12 and P&H-17.
- *For aircraft and similar steels* . . . has wide range of properties under heat treatments . . . P&H-21.

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizers • Crawler and Truck Cranes • Diesel Engines
Cane Loaders • Pre-assembled Homes

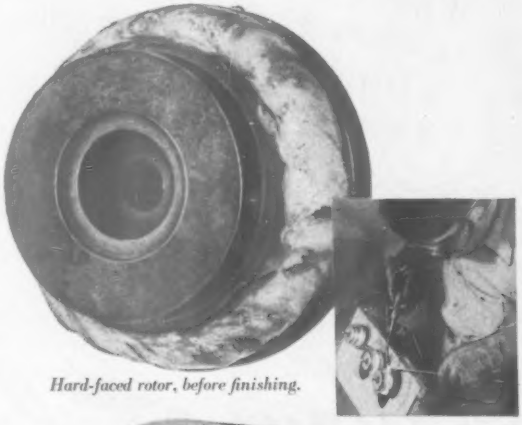
DOUBLES LIFE OF MIXER PARTS

...tough base metal withstands SHOCK
...hard-faced surfaces resist ABRASION and CORROSION

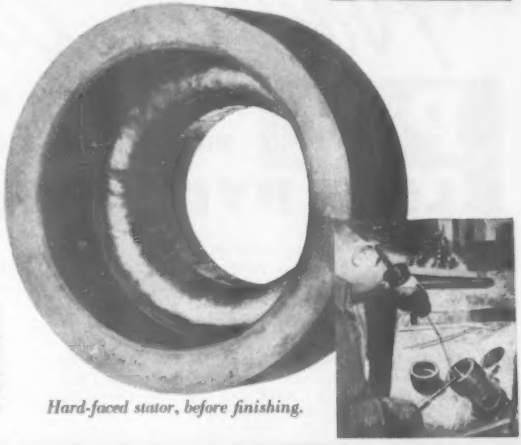
Here is another example of how hard-facing eliminates the need for a compromise when both hardness and toughness are needed for a particular part. This rotor and stator for a homogenizing machine are made from a tough base metal—Type 303 stainless steel. The bearing surfaces of the two parts are hard-faced with HAYNES STELLITE cobalt-base alloy. The parts are tough enough to stand up under the shock of pulverizing operations at high speeds... and yet the working surfaces are hard enough to resist the abrasive and corrosive effects of the materials being mixed.

For two years, no machine equipped with hard-faced parts has been returned or serviced because of rotor or stator failure. The heat-treated parts formerly used on these machines failed after only a year's service. The heat-treatment affected the corrosion resistance of the metal and also made the blades on the rotor too brittle.

For the whole story on hard-facing, including detailed procedures for applying various HAYNES alloys to wearing surfaces, write for the new 40-page booklet, "HAYNES Alloys—Hard-Facing Manual."



Hard-faced rotor, before finishing.



Hard-faced stator, before finishing.

Hard-facing doubles the life of these mixing-machine parts. In operation, they run with very close clearance at speeds of at least 3600 revolutions per minute. The clearance between the hard-faced bearing surfaces is filled in with the abrasive mixture.

HAYNES alloys

TRADE-MARK

"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

New AISI Boron Steels to Conserve Manganese, Nickel, Chromium and Molybdenum

These steels are in the early stages of production. The 80Bxx series is designed to have hardenability, equivalent to the 86xx steels at the same carbon content. The 81Bxx series is likewise designed to have hardenability equivalent to the 41xx steels at the same carbon content. 94B17 is designed to have hardenability equivalent to 4820.

Because of present restrictions on molybdenum the following new steels are now being made available for immediate use.

The ranges and limits shown below apply to steel not exceeding 200 sq. in. in cross-sectional area, or 18 in. in width, or 10,000 lb. in weight per piece.

80Bxx

Grade	Chemical Composition Limits, per cent					
	C	Mn	Si	Ni	Cr	Mo
80B20	0.17/0.23	0.45/0.70	0.20/0.35	0.20/0.40	0.15/0.35	0.08/0.15
80B25	0.21/0.28	0.50/0.75	"	"	"	"
80B30	0.27/0.34	0.55/0.80	"	"	"	"
80B35	0.32/0.39	0.65/0.95	"	"	"	"
80B40	0.37/0.45	0.70/1.00	"	"	"	"
80B45	0.42/0.50	"	"	"	"	"
80B50	0.47/0.55	"	"	"	0.25/0.50	"
80B55	0.50/0.60	"	"	"	0.30/0.55	"
80B60	0.55/0.65	"	"	"	"	"

81Bxx

Grade	Chemical Composition Limits, per cent					
	C	Mn	Si	Ni	Cr	Mo
81B35	0.32/0.39	0.70/1.00	0.20/0.35	0.20/0.40	0.30/0.55	0.08/0.15
81B40	0.37/0.45	"	"	"	"	"
81B45	0.42/0.50	"	"	"	"	"
81B50	0.47/0.55	0.75/1.05	"	"	0.35/0.60	"

94Bxx

Grade	Chemical Composition Limits, per cent					
	C	Mn	Si	Ni	Cr	Mo
94B17	0.14/0.20	0.70/1.00	0.20/0.35	0.30/0.60	0.30/0.55	0.08/0.15

Note 1. These steels can be expected to have 0.0005 per cent minimum boron content.

Note 2. The phosphorus and sulphur limitations for each steelmaking process are as follows:

Basic electric furnace	— 0.025 maximum per cent
Basic open hearth	— 0.04 maximum per cent
Acid electric furnace	— 0.05 maximum per cent
Acid open hearth	— 0.06 maximum per cent

Note 3. Minimum silicon limit for acid open hearth or acid electric furnace alloy steel is 0.15 per cent.

Note 4. Small quantities of copper are present in alloy steels which are not specified or required. This element is considered as incidental and may be present in an amount not exceeding 0.35 per cent.

Grade 81xx Steels

Grade	Chemical Composition Limits, per cent					
	C	Mn	Si	Ni	Cr	Mo
8115	0.13/0.19	0.70/1.00	0.20/0.35	0.20/0.40	0.30/0.55	0.08/0.15
8117	0.14/0.20	"	"	"	"	"
8120	0.17/0.23	"	"	"	"	"
8122	0.19/0.25	"	"	"	"	"
8125	0.21/0.28	"	"	"	"	"
8127	0.24/0.31	"	"	"	"	"
8130	0.27/0.34	"	"	"	"	"
8132	0.29/0.36	"	"	"	"	"
8135	0.32/0.39	"	"	"	"	"
8137	0.34/0.42	"	"	"	"	"
8140	0.37/0.45	"	"	"	"	"
8142	0.39/0.47	"	"	"	"	"
8145	0.42/0.50	"	"	"	"	"
8147	0.44/0.52	"	"	"	"	"
8150	0.47/0.55	0.75/1.05	"	"	0.35/0.60	"
8155	0.50/0.60	"	"	"	"	"
8160	0.55/0.65	"	"	"	"	"

Modified 86xx Steels

Grade	Chemical Composition Limits, per cent					
	C	Mn	Si	Ni	Cr	Mo
Modified 8615	0.13/0.19	0.70/1.00	0.20/0.35	0.40/0.70	0.55/0.80	0.08/0.15
Modified 8617	0.14/0.20	"	"	"	"	"
Modified 8620	0.17/0.23	"	"	"	"	"
Modified 8622	0.19/0.25	"	"	"	"	"
Modified 8625	0.21/0.28	"	"	"	"	"
Modified 8627	0.24/0.31	"	"	"	"	"
Modified 8630	0.27/0.34	"	"	"	"	"
Modified 8632	0.29/0.36	"	"	"	"	"
Modified 8635	0.32/0.39	"	"	"	"	"
Modified 8637	0.34/0.42	"	"	"	"	"
Modified 8640	0.37/0.45	"	"	"	"	"
Modified 8642	0.39/0.47	"	"	"	"	"
Modified 8645	0.42/0.50	"	"	"	"	"
Modified 8647	0.44/0.52	"	"	"	"	"
Modified 8650	0.47/0.55	"	"	"	"	"
Modified 8655	0.50/0.60	"	"	"	"	"
Modified 8660	0.55/0.65	"	"	"	"	"

Courtesy American Iron and Steel Institute

OVER

1,000,000 CUTTING TORCHES

Demonstrate

IT COSTS LESS TO
OWN AND OPERATE

VICTOR

More than 1,000,000 VICTOR torches have been bought by the world's leading metalworking plants, shipyards, steel mills, foundries, scrap yards, welding shops, railroads, and others, for flame cutting all thicknesses of metal from light sheet to armor plate. Here's why so many prefer VICTOR cutting torches:

4 DIFFERENT VALVE LEVER POSITIONS — Operator can choose position that "feels" right to him.

CHOICE OF 90°, 75°, 45°, OR STRAIGHT HEAD—all interchangeable, so you can quickly change from one to another as work requires.

DIFFERENT TIP STYLES—each in several sizes, so you may select the right tip to get maximum cutting speed and gas economy on your job for every application.

Standardize NOW on Victor for cutting and welding—it will cost you less. Ask your Victor dealer to show you.

VICTOR
Welding and Cutting Equipment
Since 1910

VICTOR EQUIPMENT COMPANY

844 Folsom Street
SAN FRANCISCO 7

3821 Santa Fe Ave.
LOS ANGELES 58

1312 W. Lake St.
CHICAGO 7

For Your Technical Library—
Free Catalogs • Booklets • Bulletins

A Welding Engineer Reader Service

1 SPATTERPROOF COMPOUNDS—G. W. Smith & Sons, Inc., Detroit 8, Mich. 4-page bulletin tells about "Protecto-O-Metal" No. 2 for coating metal prior to welding to prevent spatter adherence. It also tells about "Protecto-O-Metal" No. 3 for protecting stock against corrosion as well as spatter.

2 STEEL WELDING—W. J. Holliday & Co., Inc., Redwood, Calif. 6-page, two-color bulletin 907 gives techniques, with illustrations, for welding "Durned" steels, including hard-cased, heat-treated and hot rolled alloy plates. Electrodes, name of manufacturer, polarity, rod size, amp and volt data are included.

3 PLASTIC GOGGLE LENS—The Goggle Parts Co., Cleveland 15. 6-page, pocket-size folder views the "Herlite" and "Acrilite" all-plastic lenses for goggles. Their anti-fogging, anti-scratch and anti-abrasive qualities are explained as well as glass available. See page 64.

4 FLASH-BUTT WELDER—Sciaky Bros., Inc., Chicago 38. Single-sheet bulletin tells about the BMFU-75 welder for making flash welds in tubular legs of metal furniture. Clamping, upsetting, speed and circuit operation are described. See page 93.

5 ALUMINUM SPOT WELDING—Progressive Welder Sales Co., Detroit 34. 4-page pictorial Bulletin 5101 relates the advantages of three-phase spot welding of aluminum and alloy steels in the aircraft industry. Press-type and suspension welder control features and operating characteristics are outlined.

6 WELDING FITTING GUIDE—Taylor Forge & Pipe Works, Chicago 90. Dimensions on welding fittings and flanges have been collected and closely presented on two sides of an 8½ by 11 in. card. One side covers the "WeldELL" line of long-radius turns, caps, stub ends straight tees, etc. The other side is devoted to flanges: neck, threaded, slip-on, lap-joint and blind types.

7 ARC WELDING—Precision Welder Mfg. Co., Chicago 24. 4-page bulletin pictures and describes Model 35-S arc welder and lists specifications for three other models. A carbon-arc torch is also shown and described.

8 PORTABLE GRINDER—Chicago Wheel & Mfg. Co., Chicago 7. 4-page, pocket-size folder tells about the "Hi-Power" grinder for finishing dies, pressings, small welds, etc.

9 TOGGLE CLAMP—Detroit Stamping Co., Detroit 8. Bulletin tells about plier-type toggle clamp, "De-Sta-Co", No. 454 for holding metal during welding or brazing operations. Pictures show operation and text describes construction. See page 45.

THE WELDING ENGINEER will request manufacturers to send readers the literature in which they are interested. Two post cards are printed here, each containing space for four Items.

These cards not good after July 1, 1951

Write in circle number of Item describing one catalog wanted → ○

Your Company _____

Name _____

Address _____

_____ Title _____

THE WELDING ENGINEER, APRIL, 1951

Write in circle number of Item describing one catalog wanted → ○

Your Company _____

Name _____

Address _____

_____ Title _____

THE WELDING ENGINEER, APRIL, 1951

Write in circle number of Item describing one catalog wanted → ○

Your Company _____

Name _____

Address _____

_____ Title _____

THE WELDING ENGINEER, APRIL, 1951

Write in circle number of Item describing one catalog wanted → ○

Your Company _____

Name _____

Address _____

_____ Title _____

THE WELDING ENGINEER, APRIL, 1951

HOW TO ORDER: Fill out one of the small card sections completely (name, address, your company, etc.) for each piece of literature you would like to have. Each card section must be completely filled out; do not use ditto marks. Each circle must contain the number that appears with the item on which you desire further information.

Write in circle number of Item describing one catalog wanted → ○

Your Company Times Mfg. Co.

Name John Smith

Address 317 Lewis Ave.

Chicago, Illinois

Title Engineer

THE WELDING ENGINEER

CARDS NOT GOOD AFTER JULY 1, 1951

Fold In Staple Here

THE WELDING ENGINEER

842 NORTH MICHIGAN AVE.

CHICAGO 11, ILL.

10 REPAIR ELECTRODE TIPS—P. R. Mallory & Co., Inc., Indianapolis, Ind. Literature tells about "Sta-Tip" process for silver brazing new tips to used spot welding electrodes. Timely saving of critical materials is also discussed. See page 44.

11 CABLE CONNECTOR—Erico Products, Inc., Cleveland 5, Herbert Erico "Cadweld" electrical connection metallurgy provides new charts explaining the various types of conditions and molds for welding cable connections, power cables, T-connections, etc. Operating instructions are included.

12 WELDING ALUMINIZED STEEL—Armco Steel Corp., Middletown, O. 24-page booklet features Armco's "Aluminized" steel as to properties of the aluminum surface, heat and corrosion resistance and heat reflectivity. Excellent discussion is included on arc, resist, spot and oxy-acetylene welding and brazing of this steel.

13 CHROME-STAINLESS TUBING—The Babcock & Wilcox Tube Co., Beaver Falls, Pa. 4-page bulletin outlines physical and mechanical properties of AISI types 405, 410 and 416 stainless tubing steels. Data is contained because of restrictions on chrome-nickel stainless.

14 STUD-WELDING POWER—Nelson Stud Welding Division, Morton-Gregory Corp., Lorain, O. Specifications and performance characteristics of two "Nel-weldar" power units for stud welding are listed in a 4-page bulletin.

15 METAL CLEANING—Pennsylvania Salt Mfg. Co., Philadelphia 7. 6-page, double-folded booklet called "Heavy-Duty Alkaline Cleaning of Ferrous Metals" describes methods for alkaline rust-proof cleaning, spray cleaning, etc.

16 WATER SCALE CONTROL—Aqua Chemic Scale Control, Cleveland 15. 4-page bulletin No. 100 gives the operating principle of a small self-contained hot water-cooled equipment such as restaurant, soda urn.

17 HEAVY-COATED ELECTRODE—Lincoln Electric Corp., Welding Div., Milwaukee, 14. Literature tells about the DH-4 heavy-coated electrode for fast position and solid fusion. Its low-spatter characteristics and applicability to heavy sections are explained. See page 42.

18 MAGNETIC AMPLIFIER—Vickers Inc., Electric Div., Vickers, Inc., St. Louis 6, Mo. 16-page catalog 20-A gives a complete listing of specifications for magnetic amplifiers including circuits, characteristics and types.

19 SPOT WELDING SHIELDS—Allen-Bailey Appliances Co., Pittsburgh 8. 4-page bulletin CH-4 presents a new line of transparent shields for guarding against welding sparks, clean-up which, hot metal, flying pits, etc. Specific uses are listed for "Clearvue" and "Clearprof" shields.

20 GRINDING ATTACHMENTS—Do-All Weld Tool Corporation, Pa. 12-page catalog tells about grinding, cutting, saw-ing, boring and grinding attachments for Do-All radial-arm woodworking machines. Part numbers, dimensions and descriptions of each attachment is given.

21 COOLANT EQUIPMENT — Delta Power Tool Div., Rockwell Mfg. Co., Milwaukee 1. Literature tells about Delta-Milwaukee coolant pumps and says for use on most wet machine tools. All details about pump, motor, tank, coolant and operation are discussed.

22 WELDING GUIDE—All-State Welding Alloys Co., Inc., White Plains, N. Y. 32-page post-a-matic booklet provides a complete guide to All-State welding alloys and brazes. It is believed and easy reference to show the correct rod for any particular job.

23 FLEXIBLE SHAFT GRINDERS—N. A. Brand Div., The Balmer Corp., Chicago 40. 32 page Catalog 31 tells about flexible shaft grinders from ⅛ to 3 hp rating. Accessories, shafting, spindles and hand pieces, couplings and mountings are illustrated and described.

24 REBUILDING WHEELS—The Linde Air Products Co., New York City 17. 4-page pamphlet F-2345 describes the successful rebuilding of valve-bonnetless wheels for the oil-pressure welding process. Originally appearing in THE WELDING ENGINEER, the article tells about the latest set-up, welding procedure and machine.

25 PORTABLE GRINDERS—The Dumore Co., Racine, Wis. 28-page two-color catalog 50 tells about Series 9 portable grinders for cleaning welds. Specifications, dimensions, grinding wheels and other information are listed for this series and many other types of flexible-shaft precision grinding equipment.

26 ZINC METALLIZING—Metallizing Engineering Co., Inc., Long Island City 1, N. Y. How the interiors of two 40,000 gal. steel water tanks that were metallized with zinc in 1934 have stood up to date. Bulletin also tells about metallizing cathodic-type power apparatus.

THE WELDING ENGINEER will request manufacturers to send readers the literature in which they are interested. Two post cards are printed here, each including space for four items.

These cards are good after July 1, 1951

Place 1c Stamp Here

THE WELDING ENGINEER

520 NORTH MICHIGAN AVE.

CHICAGO 11, ILL.

Write in circle number of item describing one catalog wanted →

Your Company

Name

Address

Title

THE WELDING ENGINEER, APRIL, 1951

Write in circle number of item describing one catalog wanted →

Your Company

Name

Address

Title

THE WELDING ENGINEER, APRIL, 1951

Write in circle number of item describing one catalog wanted →

Your Company

Name

Address

Title

THE WELDING ENGINEER, APRIL, 1951

Write in circle number of item describing one catalog wanted →

Your Company

Name

Address

Title

THE WELDING ENGINEER, APRIL, 1951

The Defense Production Problem

To win out in the struggle for freedom into which the Russian Communists have plunged us we must do at least four things. We must:

1. Speedily carry through a program of defense production which, at its peak, is scheduled to take about one-fifth of our national output.

2. Pay for this program as we go, by methods that will enable us to maintain the effort for an indefinite period – as long as may be necessary to insure peace and security.

3. Manage intelligently and endure intelligently a set of direct government controls which, in certain critical departments, will put our national economy for a time in a hateful straight jacket.

4. See that these emergency controls are not fastened upon us permanently thereby presenting to our Soviet antagonists a major victory for collectivism on our home front.

This is the first of a series of editorials designed to present in the simplest terms these key aspects of our struggle to preserve our free institutions.

A Staggering Task

The magnitude of the defense production job staggers the imagination. Over the next year it calls for a larger volume of goods and services than the 20 million people of the states of New York and New Jersey will use for all purposes. The (London) TIMES has observed that, taken alone, the increase of defense expenditures which has been budgeted for the federal government's coming fiscal year (about $30 billion) "is in itself not far short of the total national income of the United Kingdom."

Yet so powerful is the production machine created by free American enterprise that, at the scheduled peak, the defense program will take only about one-fifth of our total national output. The exact form and dimensions of the program will, of course, be hammered out on the anvil of public and congressional debate. But the President's recent estimate of an annual rate of expenditure of $45-55 billion for defense by the end of this year may well turn out to be somewhere near right.

To meet even these vast requirements of defense production we are in better shape technically than we were when we started to prepare for World War II. Our industrial plant and equipment is greatly improved. Over $65 billion has been invested in it since V-J Day. Our working force is about eight million larger than it was ten years ago and much better trained.

The difficulty, and it is a very serious economic difficulty, is that we must fit the defense program into a productive machine that has been almost fully extended to meet the needs of a booming civilian demand. The present plan is to step up defense production during 1951 from about 7% to about 18% of our total national output. Because there is relatively little slack in our economy, this means that civilian production at the outset must

be cut back as defense production is stepped up.

The cut-back of civilian goods must be especially severe in the case of products made of metal. This is particularly true of goods that use scarce strategic metals such as aluminum and copper. Of our total defense production program, about half will go for "military hardware" – airplanes, guns, munitions, tanks and the machinery to make them. By the end of 1951 defense requirements are scheduled to absorb most of the metalworking production not required for essential construction and for the spare parts necessary to keep existing equipment running. For a time at least, there will be a sharp cut in the supply of new metal products available to civilian consumers. The defense squeeze on both materials and manpower will also cut sharply into housing and other civilian construction.

For the Short Run — Controls

In the short run there is no answer to the problem of meeting defense production schedules except controls. Sharp reduction of non-defense expenditures by government is essential and would help greatly. But the basic fact is that we cannot increase our total production fast enough to meet immediately both civilian and defense requirements.

Controls are needed, therefore, to switch resources from civilian to defense production, and at the same time prevent the combined demand for critical products from sending prices right through the roof. In the case of many scarce strategic metals such as nickel, copper and cobalt, the task of increasing output is especially difficult because our limited supplies are tucked away deep in the earth in many quarters of the globe.

For the longer pull – and that is what we must face – there is another answer to our defense production problem that is infinitely better than controls. And this time, in contrast to World War II, it is all-important that we get the right answer to our defense production problem for the longer pull and that we get it right now. In World War II we geared our economy to meet the requirements of a relatively short and decisive conflict. Now our leaders, however they may differ as to methods, are well agreed that, at best, "the conditions under which we labor may persist for ten, fifteen or twenty years." That is General Bradley's phrase.

For the Long Pull — More and Better Production

For this longer pull, the constructive answer to our problem of defense production is clearly more and more efficient production all along the line. It is true that overall we now have the most efficient industrial establishment in the world. But, even so, much of it is far short of attainable efficiency. Some plants using up-to-date equipment and methods are as much as six times more efficient than others in the same industry that are lagging in modernization.

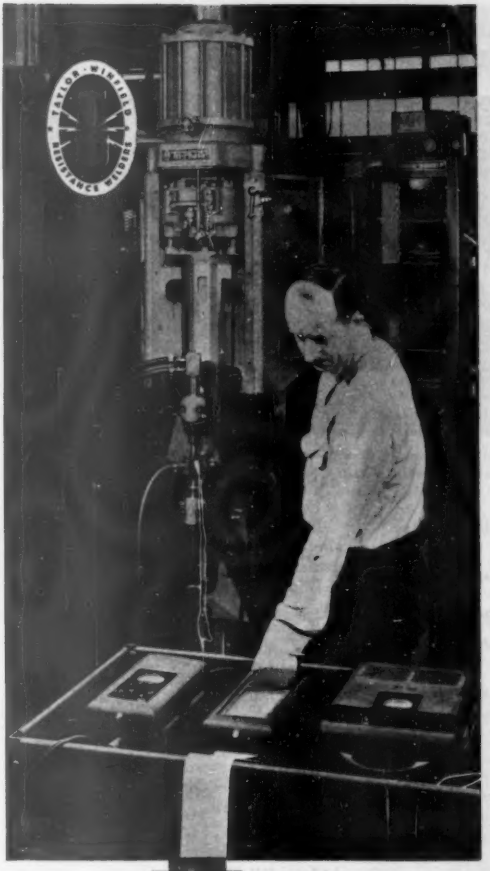
Our Director of Mobilization, Charles E. Wilson, has clearly in mind this problem of increasing our industrial efficiency. The first step in his job, as he conceives it, is to get out an adequate supply of weapons to equip the army, navy, and air forces already mobilized or in process of organization by us and our allies. The second step is to make sure of our capacity to produce both "military hardware" to meet any increased requirements and the maximum possible volume of goods for civilian use.

In concentrating on more and more efficient production, Mr. Wilson is squarely on the beam. We can attain his objective – by sustained effort on the part of each one of us backed by up-to-date industrial methods and equipment.

If we do that, we can maintain indefinitely an adequate defense effort and at the same time enjoy a standard of living higher than any other in the world.

Additional production and more efficient production are our surest safeguards against our two most menacing enemies on the home front – the deadly inflation that can destroy our free economy, and the strangling government controls that can destroy our political freedom.

McGraw-Hill Publishing Company, Inc.



welding specifications a problem?

BRUSH ANALYZER RECORDS WELDING CURRENT AND TIME EXACTLY

● The Taylor Winfield Corporation, manufacturer of resistance, spot, seam, and butt welders, makes sure of correct current and timing calibration on each spot welder before shipment.

While a sample weld is being made, a Brush Analyzer records amplitude and timing of both input current and welding current on the same chart. By observing the wave shapes, Taylor Winfield inspectors calibrate controls quickly and surely. Production time is saved, and correct results assured.

Maintaining welding specifications is difficult with "rule-of-thumb" adjustment, particularly on metals such as aluminum. Brush Analyzers can give you written proof of welding currents, or of electrode pressures.

Investigate Brush instruments for studies of d-c or a-c voltages or currents, strains, displacements, light intensities, temperatures, and other static or dynamic conditions. Write for information. The Brush Development Company, Dept. X-5, 3405 Perkins Avenue, Cleveland 14, Ohio, U. S. A. *Canadian Representatives:* A. C. Wickman (Canada) Limited, P. O. Box 9, Station N, Toronto 14, Ontario.

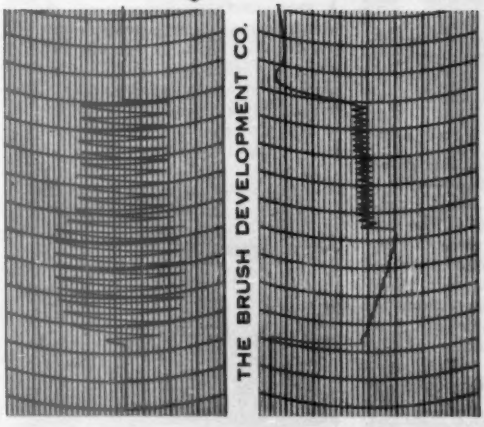


Chart of welding cycle on Taylor Winfield welder shows 60-cycle A-c input current at left, D-c welding current at right. This Brush Analyzer consists of A-c amplifier, D-c amplifier, direct-writing oscillograph.

Put it in writing with a
BRUSH RECORDING ANALYZER

THE **Brush** DEVELOPMENT COMPANY

PIEZOELECTRIC CRYSTALS AND CERAMICS • MAGNETIC RECORDING
ELECTROACOUSTICS • ULTRASONICS • INDUSTRIAL & RESEARCH INSTRUMENTS

on the job

STAINLESS-STEEL tank built by inert-arc metal-arc welding is 20 ft in diameter and stands 35 ft high

SHAPES smooth and uniform are assured through use of motorized torches added to a shape-cutting machine

Inert-Arc Metal-Arc Welding

*By M. M. Griffith**

METAL-ARC welding with a shielding blanket of helium or argon ranks, without a doubt, as one of the foremost metalworking developments of recent years because of its many uses as a high-production tool. Primarily designed for mass production or large scale operations, the process may be applied with either a manual welding gun, a fixed-position gun for mechanized work or by means of an automatic welding head. With the manual unit, welding may be performed in the horizontal, vertical and overhead positions as well as the flat.

Principal source of economy in using this process is found in the lack of joint preparation prior to welding. On ¼ and 5/16 in. stainless plate, for example, the only joint preparation required for butt welds was to grind off the corners approximately 1/16 in. However, correct fit-up is of the utmost importance. Poor fit-up will make it next to impossible to use the inert-arc metal-arc process with satisfactory results.

Though the process was first conceived for the welding of aluminum, it is today being used by many shops in the fabrication of other metals and alloys. As an illustration, the picture at top left shows a stainless-steel storage tank that we recently fabricated for a major oil company in Southern California. This tank measures 20 ft in diameter and stands 35 ft high; it was constructed of type 316 stainless and will be used to store naphthenic acid, a by-product of the gasoline refining process.

*Welding technician, Southwestern Engineering Co., Los Angeles.

* * *

Motorized Shape-Cutting

(See right top picture)

A PANTOGRAPH-TYPE shape-cutting machine newly added to the Chicago warehouse of the United States Steel Supply Co. (a U. S. Steel subsidiary), combines motorized torches with an electronic tracer. The equipment was designed at the request of Supply company officials to assure that flame-cut shapes would be smooth and uniform.

The operator does not have to climb up on the plate to adjust the torches. Instead, he uses the switch on the control panel to maintain the proper space between torch tip and plate surface.

* * *

Resistance Welding Cuts Costs

FLORENCE STOVE CO., Gardner, Mass., has reduced the cost of producing its heaters considerably by designing them for resistance welding. The jacket is assembled from three pieces—front, top and wrap-around back and ends. These are welded before enameling. Similarly, the combustion chambers on the inside are seam welded (for gas tightness) before porcelain enameling.

Other resistance-welded portions of the heater include:

Humidifier on the back—a drawn stamping instead of a heavy casting, seam welded to make it watertight.

Base—formed with four corner plates spot welded into place.

Burner support—formed from two simple steel parts spot welded together.

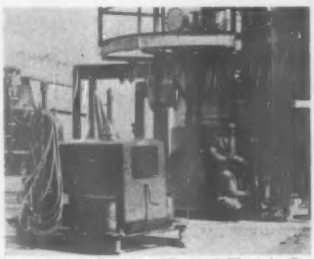
Door spacers, lower oil reservoirs, etc.

In addition to the substantial cost saving, appearance and sturdiness of the product have improved immeasurably, the company reports. Any enameled part if under a strain is liable to chip if it is jarred in handling or shipping. With resistance welding, there are no strains; the welds are invisible; the enameled coating stays even and smooth.

* * *

Aid to Oil Fields

A SKID-MOUNTED engine-driven d-c welder proved to be a versatile construction tool for the Brown Lite Construction Co., Tulsa, Okla. The skid platform also carries electrode containers, a tool box, oxygen and acetylene cylinders and other equipment for pipe cutting.



Courtesy General Electric Co.

SKID-MOUNTED d-c welder with flame-cutting equipment provides a neat package for pipe-line work

Brown Lite has had many pipe-line customers in the southwest, including the Southwestern Public Service Co., Amarillo, Tex.; Texoma Natural Gas Co., Chicago; Stanolind Pipe Line Co., Tulsa; The Texas Pipe Line Co., Houston; Magnolia Petroleum Co., Dallas, and Salt Lake Pipe Line Co., Salt Lake City, Utah.

* * *

Inert-Arc Spot Welding

KAISER STEEL CORP., Fontana, Calif., received an order for 10,000 tons of 12¾-in. pipe. To protect the pipe during handling and shipping, a stipulation was made that a cap with a 1-in. lip be put on each end of the pipe at the mill. The original specifications called for the caps to be tack welded to the pipe but this proved impracticable as good tack welds could not be made consistently between a 0.040-in. cap and a pipe of 0.250-in. wall thickness.

The inert-arc spot-welding torch was recommended for this tricky job. A special clamping device (see picture below) was designed to press the cap tight to the pipe at the points where the three spot welds were made. This clamping eliminated all difficulties of caps not fitting the pipe closely enough for a metal-to-metal contact.

A single spot-welding torch not only kept up with an 8-hour day mill production but also caught up with a backlog of 2,000 lengths of pipe that were waiting to be capped at the time the torch was introduced. Rejects due to bad spot welds were held to a minimum.

An entirely different application of inert-arc spot welding is described on page 21.

Courtesy Linde Air Products

CAP FOR protection in shipment is being spot welded by inert-arc torch to length of 12¾-in. pipe

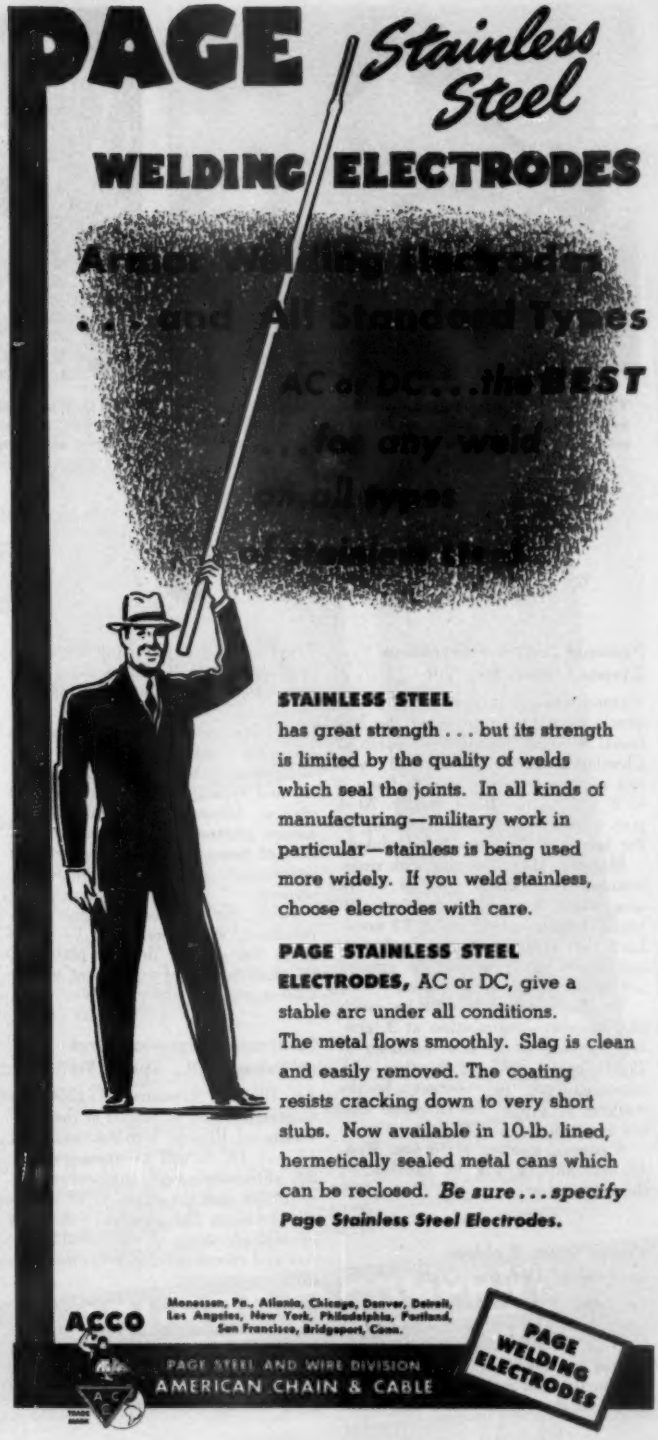

PAGE
Stainless Steel
WELDING ELECTRODES
STAINLESS STEEL
has great strength . . . but its strength is limited by the quality of welds which seal the joints. In all kinds of manufacturing—military work in particular—stainless is being used more widely. If you weld stainless, choose electrodes with care.
PAGE STAINLESS STEEL ELECTRODES, AC or DC, give a stable arc under all conditions. The metal flows smoothly. Slag is clean and easily removed. The coating resists cracking down to very short stubs. Now available in 10-lb. lined, hermetically sealed metal cans which can be reclosed. Be sure . . . specify Page Stainless Steel Electrodes.
ACCO
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE
PAGE WELDING ELECTRODES

Photo courtesy Lincoln Electric Co.

TATTERED shreds of exploded 30-in pipe show that the welds held. Both the longitudinal and circumferential seams were intact in nearly a mile of torn pipe

Photo courtesy Inland Steel Co.

FIELD WELDED 236,000 gal cone settles water at Inland Steel coal cleaning plant at Price, Ky. Washed coal ups pig iron output, saves on freight costs

NEWS

National NWSA Convention Events Listed, May 7-9

THINGS will get started early in this year's annual convention of the National Welding Supply Association at Cleveland, May 7-9. In fact, you can register Sunday, May 6, from 3 to 8 p.m. at the Hotel Statler. At 4 p.m. Sunday afternoon, a meeting of the board of directors is scheduled.

Monday, May 7, begins with registration of delegates from 9 to 10 a.m. when the general meeting will begin. Luncheon will be at 12 noon. Last year's newly inaugurated contact booth program will be carried out again this year at 2 p.m.

Tuesday's schedule will be much like Monday—registration at 9, general meeting at 10 and luncheon at 12. Delegates will get together with manufacturers in contact booths starting at 2 p.m. An informal dinner is planned for 6:30 p.m.

A general meeting at 10 a.m. Wednesday, May 9 will be the last of the convention.

* * *

Power from Welders in Atomic Defense Plan

To bring light if an atomic bomb damages the power plant, the city of Norfolk, Va., has formulated a plan to use engine-driven welders as an auxiliary power source. The idea originated in the fertile brains of Martin Friedmann, Jr., job shop owner in Norfolk, and G. W. Shoemaker, assistant city engineer, working together in Norfolk's office of civilian defense.

Owners of engine-driven welders have been asked to register their equipment as to make, model, capacity and type of mounting with local civilian defense people. In addition, names, addresses and telephone numbers of men competent to operate the welders are requested of the welder owners.

After the information has been tabulated, suggestions will be made as to the general defense plan and the distribution of equipment within various areas of the city.

* * *

Structural Engineers Meet at Urbana, Ill., April 17-18

AN Illinois Structural Engineering Conference will be staged at the University of Illinois, Urbana, on April 17 and 18. It will be sponsored by the university's civil engineering department and the division of extension services. The program will cover general planning of structural projects and recent developments in structural engineering.

* * *

Senator Mundt to Speak at Cleveland Welding Confab

PRINCIPAL speaker at the twelfth annual welding conference of the Cleveland Section of the American Welding Society will be U. S. Senator Mundt. The Allerton Hotel ballroom is the scene of the conference, which is scheduled for May 11. Jack Jarms is chairman.

Technical sessions, starting at noon, will include talks by James Hyslop, president, Hanna Coal Co.; Ross Yarrow, Republic Structural Iron Works, and Sherman Heald, Republic Steel Corp.

Senator Mundt's speech will be heard at the evening banquet session that starts at 6 p.m. Toastmaster will be Louis B. Seltzer, editor of *The Cleveland Press.*

* * *

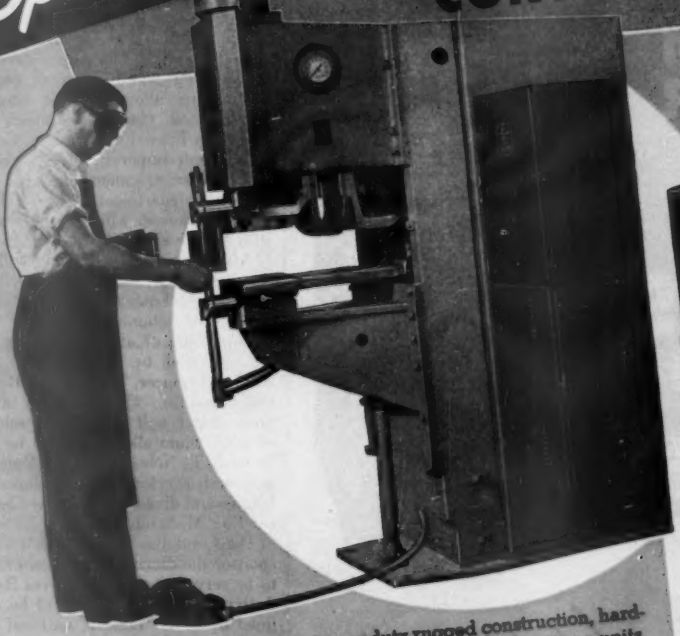
Eighth Chapter Starts in Canadian Welding Society

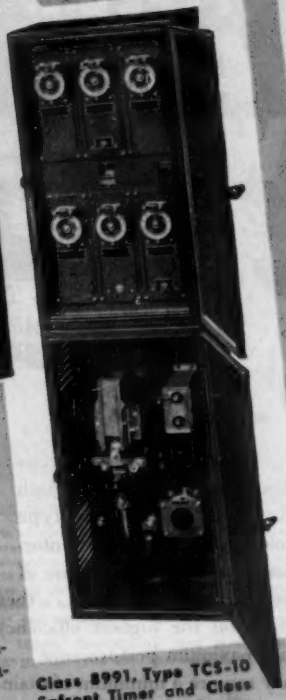
THE growing Canadian interest in welding matters was given a boost February 20 with the inauguration of the eighth chapter of the Canadian Welding Society at London, Ont. Principal speaker for the evening's audience, estimated at 150, was Harry Thomasson, director, metallurgical section, research and development laboratories, Canadian Westinghouse Co.

Top chapter officers to start the new section on its way are Jess W. Pawley, London Concrete Machinery Co., chairman and L. F. Pepino, Richards-Wilcox Canadian Co., vice-chairman.

Much credit for the organization of the London chapter is due Lorne McCall of the Canadian Liquid Air Company. Regular meetings for March, April and May are scheduled at the London YMCA building. Eight company members have already been signed.

Specify.. SQUARE D Safront RESISTANCE WELDER CONTROL





FOR CONTINUOUS PRODUCTION—heavy duty rugged construction, hardened moving parts, and accurate, dependable pneumatic timer units.

FOR OPERATOR SAFETY—Safront panel construction isolates individual timer adjustments from live parts. Transformer provides 110 volts for all control circuits.

FOR MOUNTING FLEXIBILITY—Dimensions are standardized. Timers and contactors can be mounted in four different positions for wall or machine mounting.

FOR LOW INSTALLATION COST—Matching knockouts permit close coupling of enclosures, eliminating need for conduit run between contactor and timer.

FOR SIMPLIFIED MAINTENANCE—Accessible mechanical parts and easy coil replacement reduce "down" time and maintenance costs.

When extreme precision or speed is required—use Square D's Electronic Welder Control. Write for Bulletins 8990-8993 which detail the complete Square D line, magnetic and electronic. Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin.

Class 8991, Type TCS-10 Safront Timer and Class 8990, Type SCG-2 Syncro-Break Contactor arranged for wall mounting. The same size, neat appearing enclosure is used for 4 and 6 period Safront timers and sizes 1W and 2W Syncro-Break contactors.

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

D. C. WELDERS WITH A. C. ADVANTAGES!

NEW!

miller

SELENIUM RECTIFIER TYPE D.C. ARC WELDERS

These welders combine the advantages of both the A.C. transformer type welders and the D.C. motor-generator type, with none of the limitations of either . . . they offer you the highest efficiency and maximum performance . . . they require a minimum of maintenance.

220/440 volt, 3 phase, 60 cycle A.C. Primary is standard. The knob type current control and "off and on" switch are located on the front panel. Remote current control can easily be installed. In applications where D.C. is required, these welders can be used efficiently for inert gas arc welding process. Units can be paralleled for high current application. Write for complete information.

✓check these features you'll see why—

1. Exclusive electric control of welding current makes remote control operation simple and convenient.
2. No moving parts to wear out and cause noise.
3. No replacement stock, such as brushes, bearings, etc.
4. Instantaneous voltage recovery produces greater arc flexibility.
5. Does not require high starting current.
6. Very quiet in operation.
7. Less arc blow than standard D.C. welders.

SEE YOUR miller DISTRIBUTORS now for a demonstration of these new welders.

ARC • SPOT miller WELDERS

miller ELECTRIC MANUFACTURING CO.

SINCE 1929 APPLETON WISCONSIN

Ohio Welding Conference at Columbus, April 13-14

THE twelfth annual Ohio State Welding Engineering Conference will be held Friday and Saturday April 13 and 14 on the Ohio State Campus at Columbus, with the cooperation of the American Welding Society sections of Cincinnati, Cleveland, Columbus, Dayton, Youngstown and Toledo.

Friday's session, April 13, starts out with a welcoming address by Harlan H. Hatcher, vice-president of Ohio State. The first paper, covering the welding and brazing of copper and copper alloys, will be read by Ira T. Hook, research engineer, The American Brass Co., Ansonia, Conn., and Joseph Imperati, sales engineer. F. E. Garriott, manager, weld rod and wire department, Ampco Metal, Inc., Milwaukee, will discuss welding with bronze electrodes.

Afternoon talks on Friday will begin with Dan R. Cheyney, Tube Turns, Inc., Louisville, Ky., speaking on welded aluminum piping. The field welding of aluminum tanks will be explained by Perry C. Arnold, welding engineer, The Chicago Bridge and Iron Co., Chicago. Last afternoon paper will be on the welding of magnesium alloys and will be given by R. L. Nelson and I. C. Mattson, technical service and development-magnesium division, The Dow Chemical Co., Midland, Mich.

The Columbus section of AWS will sponsor the dinner meeting on Friday to be served at the Fort Hayes Hotel. Activities of the Society will be outlined by J. G. Magrath, national secretary of AWS, at this time. Distortion and dimension control in shipbuilding will be discussed by Harry W. Pierce, president, American Welding Society, New York Shipbuilding Co., Camden, N. J.

Saturday's first talk, "Design for Welding", will be presented by T. B. Jefferson, editor, THE WELDING ENGINEER, Chicago. Simon Greenberg, technical secretary, AWS, New York City, will then talk on applied welding engineering. Products design for copper brazing is the subject of the third Saturday morning paper, prepared by Frank Humberger, executive-vice-president, Technical Metal Processing, Inc., Cleveland.

Saturday afternoon, the root pass in welding will be discussed by Mike W. Eddins and Roger A. Zimpfer, department of welding engineering, The Ohio State University. Training programs for weldors will be discussed by Orville T. Barnett, district manager, Metal & Thermit Corp., Pittsburgh. A. N. Kugler, mechanical

HARD FACING WHERE IT PAYS

Elevator buckets of cast steel (annealed) are hard faced on the top wearing edge with WEAR-ARC 12 to increase life against impact and abrasion. Ninety-five pound hammers for the impactor, 10 lb. and 20 lb. hammers for the hammermills, and dipper and shovel teeth are all built up with WEAR-ARC WH and hard faced with WEAR-ARC 12 to increase life as much as three times under severe impact and abrasion.

To reclaim worn equipment and hard face against excessive wear, you will find one, or a combination of two, of the seven basic WEAR-ARC hard facing electrodes does the best job . . . increases life as much as four times or more.

WEAR-ARC WH is ideal for build up on manganese steel; WEAR-ARC 12 for providing that hard wearing surface.

Ask for bulletin No. 10550, illustrating and describing properties and welding procedures for the complete line.

"I Like the rod that comes in the RED can"

SEE YOUR NEAREST ALLOY RODS DISTRIBUTOR

ALLOY RODS CO. York, Penna.

Longer Life—Less Downtime with

BERYLCO BERYLLIUM COPPER

The ideal resistance welding electrode material is one which combines high electrical and thermal conductivity with great mechanical strength . . . and the alloy which combines strength with conductivity to ideal degree is Berylco beryllium copper.

Berylco has a conductivity as high as 55 percent, tensile strength up to 210,000 psi, or Rockwell hardness ranging from B95 to C45. Berylco's thermal conductivity increases with increased temperature. It has a low surface contact resistance, which means less sticking between electrode and work. The beryllium copper alloys commonly specified for resistance welding are Berylco 50 and Berylco 25. Berylco 50 exceeds the requirements of RWMA Class 3 alloys while Berylco 25 more than meets the requirements of a Class 4 alloy.

What are the advantages of Berylco?

Berylco 50, because of high strength, is ideal for welding many steels, including stainless. It successfully withstands the high pressures demanded and its superior conductivity permits KVA capacity to be lowered.

In its hardened state, Berylco 25 alloy is possibly the best flash welding and butt welding material obtainable. Manufacturers report that Berylco 25 stands up much longer than previously used materials on automatic machines working under hydraulic pressure. Because it has the ability to resist flash, it has to be dressed less often.

A big advantage of Berylco wrought bar stock and seam welding wheels made of rolled stock is its more uniform hardness and ductility as compared with forged materials. The surface is free of hard and soft spots—wears at a uniform rate.

For long life, decreased downtime, lower maintenance costs, and increased production, it will pay you to select Berylco whenever you have a tough resistance welding problem.

BERYLCO BERYLLIUM COPPER IS AVAILABLE IN ROD AND BAR STOCK AND IN STANDARD SIZE WHEELS

TYPICAL PROPERTIES OF FULLY HEAT TREATED WROUGHT BERYLCO ALLOYS

Berylco Alloy	RWMA Class	Ultimate Tensile Strength, psi	Proportional Limit, psi	Elongation % in 2 in.	Rockwell Hardness	Conductivity, % I.A.C.S.
50	3	110-130,000	80-100,000	8-15	B95-104	50-55
25	4	185-210,000	130-160,000	1-5	C38-45	22-28

THE **BERYLLIUM** CORPORATION • Dept. ID • READING 13, PENNA.

New York • Springfield, Mass. • Cleveland • Boston • Detroit • Chicago • Minneapolis • St. Louis • Seattle • San Francisco • Los Angeles

Representatives in principal world-trade centers

engineer, Air Reduction Sales Co., New York City, will also talk on the training of a good weldor.

More than 200 engineers and production supervisors are expected to attend the talks. As a special feature of the gathering, laboratory demonstrations of Ohio State's welding and research equipment will be staged.

* * *

W. B. Lawrence Heads Canadian Welding Society

PRESIDENT of the national council of the Canadian Welding Society for 1951 is W. B. Lawrence, sales engineer for the George Rumble Co., Toronto. He is a charter member and a past president of the Toronto chapter of CWS and has served on the council as a trustee and treasurer. Before joining the Rumble company four years ago, he was assistant plant manager at John Inglis Co.

Vice-president elected at the same time is A. E. Ellis, welding superintendent at Babcock-Wilcox & Goldie-McCullouch, Galt, Ont. Mr. Ellis has been one of the active members of the Kitchener-Waterloo chapter for many years.

A. V. Phillips, field superintendent, Toronto Iron Works, Ltd., Toronto, was also elected a vice-president. He is vice-chairman of the Toronto chapter. The new treasurer for 1951 is Charles H. Clark, International Harvester Company of Canada, Ltd., Hamilton, Ont. Past presidents are R. A. Dunn, general sales manager, Canadian Liquid Air Co., Ltd., Montreal and J. J. Kelly, Hamilton manager, Lincoln Electric Company of Canada, Ltd.

* * *

Tweco Buys Insurance Plan for Employees

ON the first day of 1951, all employees of Tweco Products, Inc., Wichita, Kansas, were eligible for benefits of a comprehensive group insurance plan. The employee gets $5,000 life insurance, $5,000 accidental death and dismemberment insurance, $25 weekly sickness and accident benefit, $7 daily hospital benefit, $217 maximum hospital charges, $200 surgical fee, $25 diagnostic X-ray and lab benefit and $1,500 polio expense benefit. In addition, an employee's dependents receive similar benefits.

The entire cost of the plan is borne by Tweco, which manufacturers electrode holders, cable connectors and other products used in the welding field.

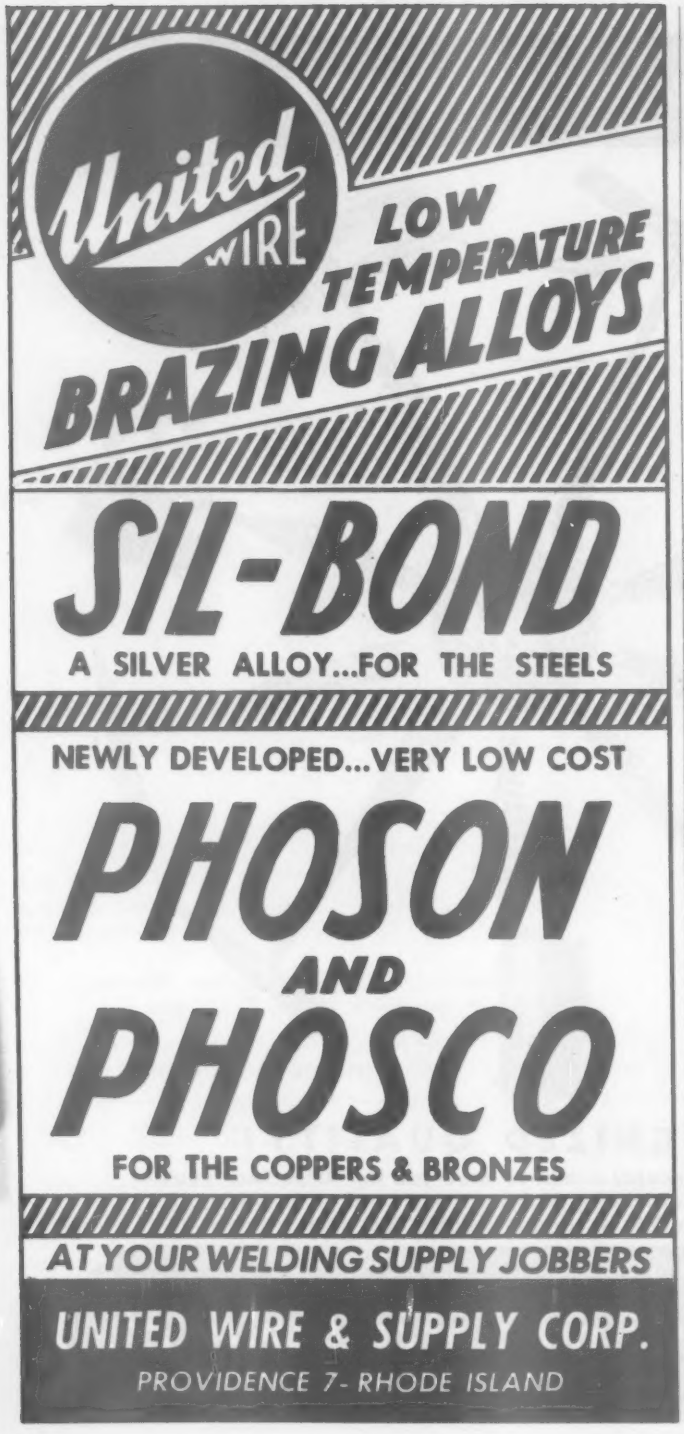
Tough as they come

RECOGNIZED QUALITY!

Ask your welding supply dealer to show you the Atlas line. You'll recognize the superiority of Atlas design and workmanship. 27 models of various weights and sizes.

Atlas WELDING ACCESSORIES CO.

707 E. LEWISTON AVENUE FERNDALE 20, (DETROIT) MICH.



"Redux" Bonded Parts Lighten British Aircraft

METAL-to-metal bonding of many aircraft parts by gluing processes has become standard practice in the British aircraft industry the last several years. Early experience with such processes was gained with glued wood to metal components in the final months of World War II. Even now, the tail fin of the 600 mph Canberra jet bomber is glued wood and metal.

"Redux" is one of the most successful glues for metals. It was developed as long ago as 1941 by Aero Research Ltd., Duxford, Cambridge. It consists of phenolic resin used to "wet" the metal surfaces, together with a polyvinyl formal powder that gives the joint considerable toughness and ductility.

Unlike the gluing of porous materials such as paper and wood, gluing of metals does not involve a mechanical interlock of adhesive and adherent. Good bonds may be made between highly polished metals with strength in no way inferior to those made between metal surfaces roughened by shot blasting or wire brushing. It is thought that different forces operate in metal bonding from other such processes—probably there are intermolecular attractions between the metal surfaces and the hardened glue.

Preparation of the surfaces before bonding necessitates removal of all traces of grease and dirt. Trichlorethylene vapor baths have given good results. Any corrosion such as rust or scale must also be removed.

"Redux" bonded panels carry appreciably higher compressive loads than riveted ones, reports C. J. Moss, project engineer of Aero Research Ltd. Fatigue loading of glued joints shows even more the superiority over riveting, because the continuous joint is almost free of stress concentrations at a series of points as in the older process.

Gluing avoids large numbers of rivets whose heads, however well made, add to the drag of the aircraft. Its use eliminates much of the chance for leaks in pressurized fuselages or in gasoline tanks.

A newer resin, "Araldite", developed by Ciba Ltd., Basle, Switzerland, gives good adhesion to metals, quartz, mica and porcelain with only light clamping.

Both these glues have been used extensively in the newest British jet aircraft such as the Comet airliner and the Vickers Supermarine Type 510 and Hawker P.1052 jet fighters.

—McGraw-Hill World News

WESTINGHOUSE RECTIFIER WELDER *Solves* CRITICAL THIN-GAUGE PROBLEMS

The exceptionally thin metals welded by Badger demand an absolutely steady arc at low current settings. Five Westinghouse Rectifier Welders with extended current ranges allow a 10-ampere minimum setting.

for The Badger Fire Extinguisher Company

Expansion Joint Division

"The Westinghouse D-C Rectifier Welder is the only welder which can handle our critical welding jobs at every point," says Mr. Walter Benson, Engineer of the Badger Fire Extinguisher Company, Expansion Joint Division, Somerville, Mass.

Welding specifications are especially rigid at this plant. The stable arc that the Westinghouse Welders supply at low current settings is essential in welding the thin metals used. These welders make uniformly tight welds on critical diaphragms and expansion joints which range in gauge from .10 to .125 inches. They handle tricky edge welds on parts ranging in size from that of a dime to that of a dinner plate.

Because most stresses occur at the weld, a joint that is as strong as the metal itself is required. The Westinghouse Rectifier Welder produces this strength in all welds. On the edge welds, penetration at least 1½ times the thickness of the metal is achieved.

Operators like the quiet performance of the Rectifier Welder. Management likes the fact that the machines do not accumulate or scatter dirt—good thin-metal welding demands scrupulously clean working surfaces.

You may never have to weld wafer-thin metals but, whatever your application—large or small—the Westinghouse D-C Rectifier Welder will handle the job best. Call your nearest Westinghouse Distributor or write Westinghouse Electric Corporation, Dept. DC-41, Welding Division, 4457 Genesee Street, Buffalo, New York. J-21610

So —"You're From MISSOURI?"

That's all right. Most of us are. But a lot of people who used to be from Missouri (when it came to Foster's Complete Remote Control for DC Welders) are now great boosters. Why? Because they were *shown.*

No amount of reading or hearsay will convince everyone. It takes nothing short of an actual demonstration.

SO, FOR THOSE FROM MISSOURI HERE'S WHAT FOSTER WILL DO—

A demonstration unit will be placed in your plant on a 15 day trial basis. If the savings in time and labor, increase in production and improvement of weld quality don't convince you you need the equipment just return the unit. (Use coupon below.)

HERE'S WHAT COMPLETE REMOTE CONTROL DOES

Transfers all welding machine controls to electrode holder. Operator can start and stop machine, select polarity and control almost full range of heat for straight polarity down-hand welding. For reverse polarity, machine is set somewhere in the desired operating range with voltage control on full. Perfect stepless control is then available at the holder for three rod sizes. Thus, if machine is set for ¼" rod, heat can be controlled at the holder for 3/16" and 5/32" rod without re-setting machine.

FOSTER TRANSFORMER CO.
3820 Colerain Ave., Cincinnati 20, Ohio
We are interested in trial offer. Send descriptive bulletin and details.

INDIVIDUAL'S NAME_____

COMPANY NAME_____ ADDRESS_____

CITY_____ STATE_____

101-FT diameter water tank welded with eight rectifier d-c arc welders.

Rectifier Welders Save on Big Water Tank Job

DIESEL fuel savings of over 70% and maintenance savings of 85% were achieved in the construction of a 2,000,000-gallon water tower through the use of eight selenium rectifier d-c welders. A single Diesel-driven generator supplied the power for the welders. The tower was built for the city of Niagara Falls, N. Y., by the Pittsburgh-Des Moines Steel Co. Eight tons of welding rod were deposited to butt weld 748 tons of steel.

Some 33 gallons of fuel oil were burned daily in the Diesel engine driving all eight generators at a total cost of $3.30. Previously a single engine-driven welding generator had required 15 gallons of fuel per day, which would have amounted to $12 per day for eight machines. Part of the savings are due to the low stand-by power needed by rectifier welders, according to Westinghouse Electric Corp.

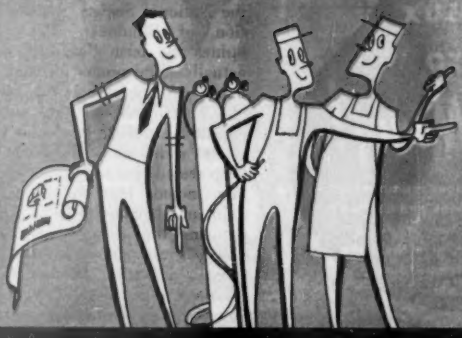
The single engine-driven generator and the eight selenium rectifier machines weigh about 62% less than eight separate engine-driven welders. This resulted in a big saving in the costs of handling the equipment and transporting it.

* * *

Arcos Opens Chicago and Los Angeles Offices

ARCOS Corp., Philadelphia, manufacturer of alloy and stainless electrodes, has opened a sales office and warehouse in Chicago. Walter G. List is district manager, coming from his post as special field engineer in the Ohio-Western Pennsylvania territory.

A west coast office and warehouse, located at 427 South Western Ave., Los Angeles, will be headed by B. E. David as district manager.



SILVALOY

. . . can help to solve these production problems for you!

Here is a partial list of production problems that solve successfully with Silvaloy Silver Brazing Alloys. Check this list—if you locate your problem here (or if you have a similar metal joining problem) make it ours without obligation, by writing us today for a technical consultation. ★ ★ ★ ★

CHECK THIS LIST!

- ☐ To join dissimilar metals.
- ☐ To join tubular assemblies.
- ☐ To seal gas, liquid, or airtight joints in pressure vessels or systems.
- ☐ To make joints that require good appearance with no finishing operation.
- ☐ To make joints that must be ductile.
- ☐ To obtain joints with best electrical conduction.
- ☐ To join two surface areas.
- ☐ To avoid metallurgical or practical difficulties caused by temperatures used in a welding process.
- ☐ To join complicated assemblies, especially where the joints are inaccessible.
- ☐ To make many joints simultaneously.
- ☐ To complete a series of joints in steps.
- ☐ To adapt to a mechanized heating operation the joining of a large production item.

DISTRIBUTED BY:

THE AMERICAN PLATINUM WORKS
NEWARK, N. J.

EAGLE METALS COMPANY
SEATTLE, WASH. • PORTLAND, ORE.
SPOKANE, WASH.

EASTERN WELDING SUPPLY COMPANY
NEW YORK, N. Y.

EDGCOMB STEEL COMPANY
PHILADELPHIA, PA. • CHARLOTTE, N. C.
BALTIMORE, MD. • YORK, PA.
KNOXVILLE, TENN.

MANUEL T. FINE & CO.
LOS ANGELES, CALIF.

THE HAMILTON STEEL COMPANY
CLEVELAND, OHIO
CINCINNATI, OHIO

FORT DUQUESNE STEEL COMPANY
PITTSBURGH, PA. • CINCINNATI, OHIO

STEEL SALES CORPORATION
CHICAGO, ILL. • MINNEAPOLIS, MINN.
INDIANAPOLIS, IND. • KANSAS CITY, MO. • GRAND RAPIDS, MICH.
DETROIT, MICH. • ST. LOUIS, MO.
MILWAUKEE, WIS.

THE AMERICAN PLATINUM WORKS

231 NEW JERSEY RAILROAD AVENUE, NEWARK 5, NEW JERSEY

SILVER BRAZING
ALLOYS and FLUX
TEAM UP TO
Save You Money!
More and more cost-conscious manufacturers are specifying GB Silver Solder and GB Flux! They have found that these two products, developed to work together, give them the best results on their low temperature brazing operations.

GB HELPS YOU CONTROL THESE COST FACTORS!

SPEED
HEATING
MATERIAL
LABOR
CLEANING
FIT-UP
PREPARATION

GB Silver Solders are available in six standard alloys—each developed to meet specific cost and production requirements. All are available in the most convenient form to meet your needs—wire coils or straight lengths, strips, sheets or formed pieces.

GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

And, if you require a special Silver Solder, Goldsmith's Technical Service Division is ready to give you competent assistance—their recommendations will be backed by 80 years of experience in alloying and refining precious metals.

GB FLUXES

Produced under strict laboratory control, GB Fluxes are fully active, deep penetrating, stable and economical. While developed primarily for use with GB Silver Solders, they produce high quality joints with any good silver solder.

GB DATA BOOK

Here's down-to-earth information on the important phases of low temperature brazing. You can get a free copy from your GB Distributor—Write us and a copy will be forwarded to you.

GOLDSMITH BROS. SMELTING AND REFINING CO.
1304 W. 59th Street, Chicago 36, Illinois
Suppliers of Precious Metals to Industry Since 1867

"Welding Flash" Troubles May Occur Again

WITH defense welding again on the upswing, the problem of eye injuries from welding flash will probably crop up also, according to Dr. Walter E. Fleischer. However, "flash" is not the right word to describe it.

Writing in the winter issue of *The Sight Saving Review*, published by the National Society for the Prevention of Blindness, Dr. Fleischer opines the term "welding flash" is actually a misnomer because the irritation to the eyes is not caused by one flash of the welding arc but by constant exposure to the arc's ultraviolet radiation. Symptoms are a deep-seated pain in the eyes that may include blurring of vision, eye pain and headache. Difficulty in refocusing the eyes on near and far objects is also sometimes experienced.

Such irritation hardly ever lasts for more than 12 to 18 hours, states Dr. Fleischer. Though it's hard to set standards of length of exposure and distance from the arc to prevent eye injury because of the many variables involved, Dr. Fleischer says that trouble can begin for nearby weldors or workers by 20 seconds watching at a distance of 7 ft. More distant workers can be effected by 17 minutes exposure at 50 ft or so.

For guarding against the misnamed flash, Dr. Fleischer advocates that clear safety lenses—rather than tinted lenses—be worn under the weldor's helmet. Obviously, shaded lenses will filter out more ultra-violet, but they increase the chances of other accidents. Clear lenses reduce accidents from tripping and stumbling and still filter out enough ultra-violet to protect the weldor who is only occasionally exposed.

Weldors rarely get flashes from their own arcs; most of the trouble comes from nearby welding arcs when a man flips up his helmet to look at his work. Reflections of ultraviolet from bulkheads, walls, screens, etc., also contribute to the accumulation of sufficient exposure to cause flash. To guard against all these, wear the clear safety lens under your welding helmet, advises Dr. Fleischer.

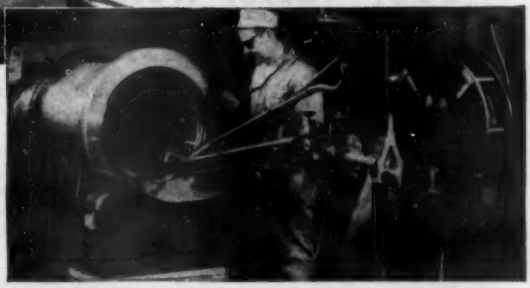
* * *

Stress Analysts Convene

THE 1951 spring meeting of the Society for Experimental Stress Analysis will be held at The National Bureau of Standards and The Wardman Park Hotel, Washington, D. C., on May 16 and 18. Inquiries should be sent to Dr. Edward Wenk, Jr., c/o The David Taylor Model Basin, Washington 7, D. C.

A Day's Output Every Hour

with UNIONMELT Welding
Trade-Mark



(*Above*) UNIONMELT welding a chromium alloy end ring to a mild steel pump shell takes only 1 hour and 23 minutes. Former methods of welding took 10 hours. Ring and shell, each 4 in. thick, are joined in consecutive passes as the work rotates under the UNIONMELT welding head.

(*Right*) This UNIONMELT welding machine smoothly deposits a sound, corrosion-resistant overlay inside a mild steel pump shell. Stainless steel metal — 20 to 120 lb. of it, depending on pump size — builds up at 20 lb. per hour. Highest former rate was 2 lb. per hour.

In making high-pressure steam pumps, these two welding operations used to take 20 hours—2½ working days. This was cut to 2½ hours by UNIONMELT welding as shown above. In addition, finishing costs dropped sharply because the UNIONMELT deposits are smoother and need less machining.

High-speed production is common wherever automatic UNIONMELT welding is used to join ferrous or non-ferrous metals. Welds up to 3 in. thick can be made in one pass; light-gage sheet can be welded at speeds up to 200 in. per minute.

UNIONMELT welding is only one of many time- and moneysaving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost. Telephone or write to our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

Unionmelt
Trade-Mark

EQUIPMENT AND SUPPLIES
for fast, automatic electric welding.
No sparks, spatter, smoke, or flash.

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

SINGLE GRINDING PASS gives smooth finish to shells of vertical electric motors.

800% faster weld removal with 3M Abrasive Belts!

LOOK AT THESE RESULTS

When Century Electric Company, Saint Louis, Missouri, installed the modern 3M Grinding Method, production of stator shells jumped from 15 to 125 pieces per hour. New backstand equipment and fast-cutting 3M Abrasive Belts eliminated one entire operation. Plus value: a smoother, more attractive finish on each seam.

Converting your present grinding and polishing equipment to this new system is easily done—and at a minimum cost. The 3M Representative in your locality will be glad to check your present finishing operations—point out ways to increase your production, cut your unit costs. Use the coupon below for free help on your grinding problems.

Minnesota Mining & Mfg. Co. WE 351
Saint Paul 6, Minn.

3M ABRASIVE BELTS

Please send copy of
"Step Up Production" Booklet.

NAME_____

FIRM_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives.
General Export: Durex Abrasives Corp., New Rochelle, N.Y.
In Canada: Canadian Durex Abrasives Ltd., Brantford, Ontario.

All-Welded Work Boat Equipped with Welders

FOR maintenance and repair work of Great Lakes freighters, a new all-welded work boat is equipped with two engine-driven arc welders and oxyacetylene welding equipment. The boat is 41 ft long, 13 ft wide and weighs, without equipment, about 7 tons. The hull is made of ¼-in. mild steel plate with topsides of 3/16 in. plate. Heavy bracing and construction affords protection against heavy seas and ice. An all-steel pilot house and deck house provide cover for crew and equipment.

The entire hull, including rub rails, bulkheads and deck framing was built upside down in the plant of the Inland Seas Boat Company, Cleveland. After the keel was laid out and erected, bulkheads and deck beams were placed in position to form the boat mold. Steel plates were carried by overhead crane and placed on the structure, ready for downhand welding.

Bottom plates were then fitted and tacked into place and topside plates fitted and tacked into place down to the rub rails (3-in. OD heavy duty pipe). Two weldors, one working from the center on the port side and the other working from starboard, did the finish welding. They worked simultaneously from amidships to the bow and then toward the stern.

With the aid of jacks and blocks, the welded hull was turned over to right-side-up position. Pilot house, deck house and motor installation were then welded in the usual manner.

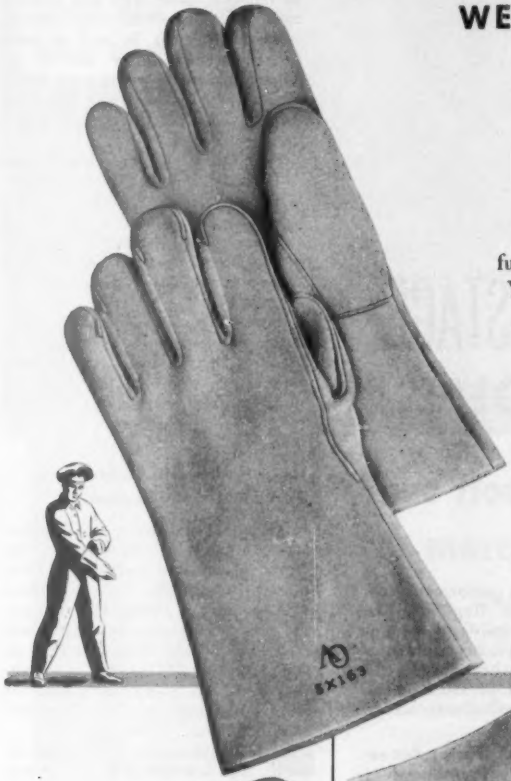
This system offers a speedy production time at low cost per boat, according to Inland Seas. It was so successful the company plans to use the same method to construct heavy-duty work boats, tugs, fishing boats and other small craft.

"Keep your eye on your work—
I'll tell you your wages!"

AO Makes the Gloves and Mittens

that **both** PLEASE and PROTECT WELDERS

AO Safety Gloves — Mittens



Here are four popular leaders from AO's full line of safety gloves and mittens for welders. You can't buy more serviceable and comfortable hand protection!

5X163 GLOVE
Long a favorite for gas welding and the heaviest amperage welding, this glove of chrome-tanned split horsehide leather provides exceptional heat resistance without excess bulk. One-piece back and palm. All vulnerable seams welted for extra protection. Lining on back of hand is extra heavy.

6X141 MITTEN Chrome-tanned cowhide. One-piece back and palm. Thumb crotch strengthened by leather strap. The back of the hand of this highly serviceable 14" glove is lined. All seams subject to heavy wear are welted. Companion model 6X142 is identical except that it is a one-finger mitten.

3003 ONE-FINGER MITTEN
Sleeves tuck into these long, 13-inch mittens to protect forearms. One-piece back and palm. Reinforcing leather strap around thumb crotch. Back of hand is lined to prevent chafing. If full mitten is desired, ask for model No. 3004. Both models chrome-tanned cowhide.

TX200 GLOVE Newest in the line, this economical chrome-tanned cowhide glove is standard length, gunn style with welted seam at base of palm and wrist. Lightweight. One-piece back and wing thumb give fuller palm, lessen hand fatigue. An excellent protection "buy"!

American Optical Company
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities

REGO

TWO-STAGE
REGOLATOR

Precision Regulation
for
OXYGEN
ACETYLENE
HYDROGEN

The precision performance of the two-stage RegOlator is especially desirable for piped distribution systems and other applications where large volumes of high pressure gases must be controlled accurately.

Two-Stage RegOlator Gives You Plus Performance!

Constant delivery pressure regardless of drop in pressure at the inlet... Patented design incorporates nozzle-type first stage counterbalanced by stem-type second stage... Triple action cartridge filter eliminates troubles usually caused by rust, dust or dirt.

Listed by Underwriters' Laboratories, Inc. and Factory Mutual.

Write for complete information.

*Reg. U. S. Pat. Off.

The BASTIAN-BLESSING Company
4201 West Peterson Ave. Chicago 30, Illinois

PIONEER AND LEADER IN THE DESIGN AND MANUFACTURE OF PRECISION EQUIPMENT FOR USING AND CONTROLLING HIGH PRESSURE GASES

Farmers Save Money on Hard-Faced Plowshares

MANY farmers today waste as much as 80 cents of every dollar they spend for plowshares. To keep ordinary plowshares in good shape, they should be removed quite often and resharpened at a blacksmith shop. The average share costs $6 and is ready for replacement after five or six trips. Each resharpening costs $1.20, according to *Fusion Facts*, house organ of The Stoody Co., Whittier, Calif.

In contrast, one hard-faced share adds an additional $4 for the hard-facing, bringing the total cost of the share to $10. But the hard-faced share is self-sharpening. It does, of course, become worn, when it can be refaced to the original contours for another $4.

Stoody estimates that one hard-faced share with two refacings, costing altogether $14, will give the same amount of service as six ordinary shares with 30 sharpenings at a total cost of $72.

* * *

Radioisotopes in Industry Talked at Case Institute

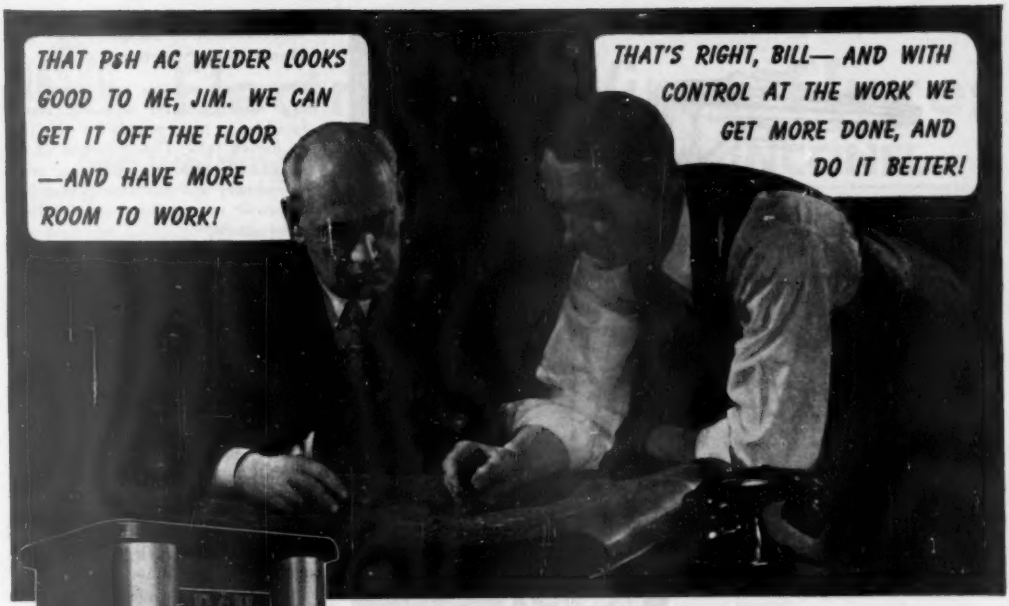
A FIVE-DAY conference on radioisotopes in industry was scheduled for April 2-6 at Case Institute of Technology, Cleveland, in cooperation with the Atomic Energy Commission. Purpose is encouragement of a safe and wide use of these materials in manufacturing and inspection. Cobalt-60 isotope has already been used for weld inspection: see THE WELDING ENGINEER, Dec., 1950, page 24.

Basic problems to be covered include the fundamentals of atomic energy, hazards accompanying atomic energy, safe handling methods, laboratory construction, control and operation and present-day applications. John R. Bradford, Radioisotopes Laboratory, Case Institute, Cleveland 6, is in charge of the program.

* * *

Lowry Stewart Opens Oklahoma Harris Calorific

AN exclusive Harris Calorific Sales Company distributorship for the state of Oklahoma, the Texas Panhandle and the Ft. Smith, Ark., area was established in March by Lowry L. Stewart. His business location is at 1620 Linwood, Oklahoma City. Mr. Stewart has just completed a year's training at the Harris factory in Cleveland. The company will offer a welding and cutting specialty business for the Southwest in the gas equipment field only.


THAT P&H AC WELDER LOOKS GOOD TO ME, JIM. WE CAN GET IT OFF THE FLOOR —AND HAVE MORE ROOM TO WORK!
THAT'S RIGHT, BILL— AND WITH CONTROL AT THE WORK WE GET MORE DONE, AND DO IT BETTER!

Save floor space, cut welding time for more production at lower cost

. . . . use P&H AC Arc Welders with exclusive Dial-lectric remote control

Give yourself more room for your production needs. Mount your P&H Welder off the floor, out of the way.

Dial-lectric remote control lets you do this. Your operator can turn the heat on *at the work*. It also cuts down his "walking time" . . . turns it into *welding* time for increased output.

Besides saving space P&H Dial-lectric control eliminates coies, coils, sprockets, gears and other moving parts that cause excessive maintenance and downtime.

P&H AC Welders are available in a full range of sizes up to 625 amps. See your P&H representative or distributor for full details on how this outstanding welder can save you time and money.

ADDITIONAL FEATURES OF P&H AC ARC WELDERS

- Easy, quick-start arc
- Stable arc
- No arc blow
- Continuous, step-less amp control
- High electrical efficiency for lower power costs
- Connectable to 220 or 440 volts
- NEMA rated

P&H

WELDING DIVISION
4513 W. National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer • Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-assembled Houses

2257

Ingenious New SMITH "FLO-TROL" eliminates seat burn-out

NO MORE BURNED OUT CUTTING VALVE SEATS
NO MORE COSTLY DELAYS
Spring-loaded diaphragm prevents reverse flow of acetylene, protects torch against back-fire and burned out seats
Special new design permits rotating welding tip in any direction even while flame is burning!
No WRENCH needed. Finger-tip pressure on nut makes gas-tight seal.
Seal rings keep gases separated until they reach proper place for mixing.
Flexible insert in back-end of cutting assembly prevents leakage of high pressure oxygen.

CARELESS OR INEXPERIENCED OPERATORS CANNOT HARM SEAT IN THIS NEW SMITH TORCH!

"FLO-TROL," an exclusive Smith feature, absolutely prevents reverse flow of acetylene to cutting valve seat area, thus eliminating danger of pre-mixing and pre-ignition. You can't go wrong. It's fool-proof. Take advantage of this technical achievement to reduce maintenance costs and eliminate production delays. This new Smith Torch with built-in protection really stays on the job . . . keeps production schedules rolling.

Equipment illustrated is Smith's LIFELONG Welding Torch Body with LIFELONG Cutting Assembly: Rugged and full size for general repair maintenance and manufacturing. Complete line of welding tips and special purpose tips is available with this model.

Smith's MIDLINE Welding & Cutting Equipment
Medium size and medium weight. Designed for production work and garage trade.

Smith's AIRLINE Welding & Cutting Equipment
Feather weight and small size. Ideal for light production, aircraft, body and fender work.

Smith's "FLO-TROL" also protects these two models.

SMITH WELDING EQUIPMENT CORPORATION
Manufacturers of fine Welding Equipment for over 40 Years

SMITH WELDING EQUIPMENT CORP.
2635 S.E. 4th, Minneapolis, Minn.

Please send me more information on the time-saving and money-saving features of your new torch.

Name_____
Address_____
City_____ State_____ 2-R

Universities to Help Man-Power Shortage

SEVENTY-six colleges and universities are offering their evening course facilities to train people for new jobs or bigger jobs. The objective of the program is to meet the defense needs of industry and business so that fewer people can produce and distribute more goods.

The 72 institutions are members of the Association of University Evening Colleges. Located in the chief urban centers, close to industrial plants and business houses, they have the necessary space and experienced administrative personnel, with industry and business as sources from which to draw instructors on a part-time basis.

Forty-eight of the institutions now actually cooperate with industry and business. The association offers to all of its members any training program that is developed by any college or group of colleges in cooperation with industry and business.

Courses include subjects as supervision, management, sales and other services auxiliary to management—not with trades, crafts, machine operation or other manual skills.

* * *

Steel Companies Move Rivers, Graveyards, Houses

THE pressure of high production and rapid expansion have forced steel companies to some strange practices. As reported by the American Iron and Steel Institute, one company is re-routing part of a river in order to gain room for a new mill building. Two cemeteries will be carefully moved by another company from land it needs to do work on. The move involves 250 graves and markers.

A number of steel companies are helping to construct a 360 mile railroad to carry iron ore in Quebec province and Labrador.

* * *

Flange Selector Card Helps Piping Layout

A REVISED edition of a flange and coupling selector in easy-to-read slide rule form has been made available by the Nooter Corp., St. Louis. The selector tells the OD of flange, thickness, OD of raised face, number of holes, diameter of holes, diameter of bolts and bolt circle for series 15 and 30 flanges. Requests for the selector should be sent on company letterhead to Nooter.

Electrodes, Wires, Fluxes

for welding MONEL · NICKEL · INCONEL

MONEL

Oxy-Acetylene	"40" Monel Gas Welding Wire	For welding Monel* using INCO "3" Gas Welding and Brazing Flux
Oxy-Acetylene	"43" Monel Gas Welding Wire	For welding heavy sections of Monel for acid pickling service — no flux required.
Metal-Arc	"130X" Monel Welding Electrode D.C.	For welding Monel
Metal-Arc	"140" Monel Welding Electrode D.C.	For welding Monel to steel and overlaying Monel on steel
Submerged Melt	"50" Monel Wire	For welding Monel
Inert Gas Metal-Arc	"60" Monel Wire	For welding Monel

NICKEL

Oxy-Acetylene	"41" Nickel Gas Welding Wire	For welding of pure Nickel—no flux required
Metal-Arc	"131" Nickel Welding Electrode D.C.	For welding pure Nickel or "L" Nickel
	"141" Nickel Welding Electrode D.C.	For welding Nickel to steel; overlaying Nickel on steel
Submerged Melt	"51" Nickel Wire	For welding pure Nickel
Inert Gas Metal-Arc	"61" Nickel Wire	For welding pure Nickel

INCONEL

Oxy-Acetylene	"42" Inconel Gas Welding Wire	For welding Inconel* using INCO "2" Gas Welding Flux
Metal-Arc	"132" Inconel Welding Electrode A.C.-D.C.	For welding Inconel; and Inconel to steel
Metal-Arc	"133" 80/20 Nickel-Chromium Welding Electrode A.C.-D.C.	For welding Inconel to steel
Submerged Melt	"52" Inconel Wire	For welding Inconel
Inert Gas Metal-Arc	"62" Inconel Wire	For welding Inconel

70/30 COPPER-NICKEL

Oxy-Acetylene	"47" 70/30 Copper-Nickel Gas Welding Wire	For welding 70/30 Copper-Nickel using INCO "1" Gas Welding and Brazing Flux
Metal-Arc	"137" 70/30 Copper-Nickel Welding Electrode D.C.	For welding 70/30 Copper-Nickel
Submerged Melt	"57" 70/30 Copper-Nickel Wire	For welding 70/30 Copper-Nickel

"K" MONEL

Oxy-Acetylene	"44" "K" Monel Gas Welding Wire	For welding "K"* Monel, using 2 parts INCO "2" Gas Welding Flux and 1 part Lithium Fluoride
Metal-Arc	"134" "K" Monel Welding Electrode D.C.	For welding "K" Monel
Inert Gas Metal-Arc	"64" "K" Monel Wire	For welding "K" Monel

LUKENS

NICKEL-CLAD STEEL

Metal-Arc	"141" Nickel Welding Electrode D.C.	For welding Nickel side only

"L" NICKEL-CLAD STEEL

Metal-Arc	"141" Nickel Welding Electrode D.C.	For welding "L"* Nickel side only

MONEL-CLAD STEEL

Metal-Arc	"140" Monel Welding Electrode D.C.	For welding Monel side only

INCONEL-CLAD STEEL

Metal-Arc	"133" 80/20 Nickel-Chromium Welding Electrode A.C.-D.C.	For welding Inconel side only

FLUXES

INCO "1" Gas Welding and Brazing Flux—For the welding and brazing of copper-nickel and other copper alloys.

INCO "2" Gas Welding Flux — For the welding of all stainless steels, rustless irons, Inconel and other chromium-containing alloys.

INCO "3" Gas Welding Flux—For the welding of Monel and other Nickel-copper alloys.

CAST IRON WELDING

Metal-Arc	NI-ROD* Electrode A.C.-D.C.	For machinable welds in cast iron
Metal-Arc	NI-ROD "55"* Electrode A.C.-D.C.	For welding cast iron of high phosphorus content and castings of heavy sections

*Reg. U. S. Pat. Off.

For further information, write for your copy of the catalogue: "INCO Welding Materials."

NICKEL (INCO TRADE MARK) ALLOYS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N.Y.

PRODUCTION ENGINEERS

helping America rearm with Aluminum should have the technical help of

LOCAL ALCOA DISTRIBUTORS

For group instruction in brazing or welding aluminum, there's nothing like Alcoa's technical library . . . 4 how-to-do-it motion pictures plus a 186-page book. Ask your Alcoa Distributor about them. You'll find him listed under "aluminum" in your classified phone book.

Or write ALUMINUM COMPANY OF AMERICA, 1943D Gulf Bldg., Pittsburgh 19, Pennsylvania.

Aluminum can be welded on automatic machines. Ask your distributor about a similar set-up for your product.

ALCOA FIRST IN ALUMINUM

Shortage Problems Talked At Western NWSA Meeting

WAYS to get around some of the problems created by the present defense emergency were discussed at the western zone meeting of the National Welding Supply Association in San Francisco in February. More than 70 delegates and members attended.

E. A. Daniels, vice-president, Victor Equipment Co., advised welding dealers to avoid slipping back into an "order taker" attitude as in the last emergency. He advised maintenance of an adequate staff to thoroughly serve sales accounts. "Don't wait for a factory man to pull your chestnuts out of the fire," he warned.

Hal Savage, president of the Arizona Welding Equipment Co., Phoenix, Ariz., suggested ways to avoid criticisms common in a seller's market. Making special efforts to satisfy customer's needs, even when you are in a bad inventory position, pays off for the dealer, he said.

Other talks were given by Arthur S. Owen, vice-president, H. M. Parker & Son, Glendale, Calif. and W. E. Cooper, Baker's Welding Supply Co., Fresno, Calif.

* * *

Eutectic Holds Classes at Flushing, L. I., Plant

THE Eutectic Welding Institute, Flushing, Long Island, N. Y., will offer a series of week-long classes in welding to men from industry. Classes for April 16 and May 14 are scheduled.

Courses include shop training in welding, brazing, hard-facing and cutting of various metals. Lectures, slides, films and demonstrations help the student. For members of the armed forces, instruction is free. Details may be obtained from the Educational Dept., Eutectic Welding Alloys Corp., 140 Worth St., New York City 13.

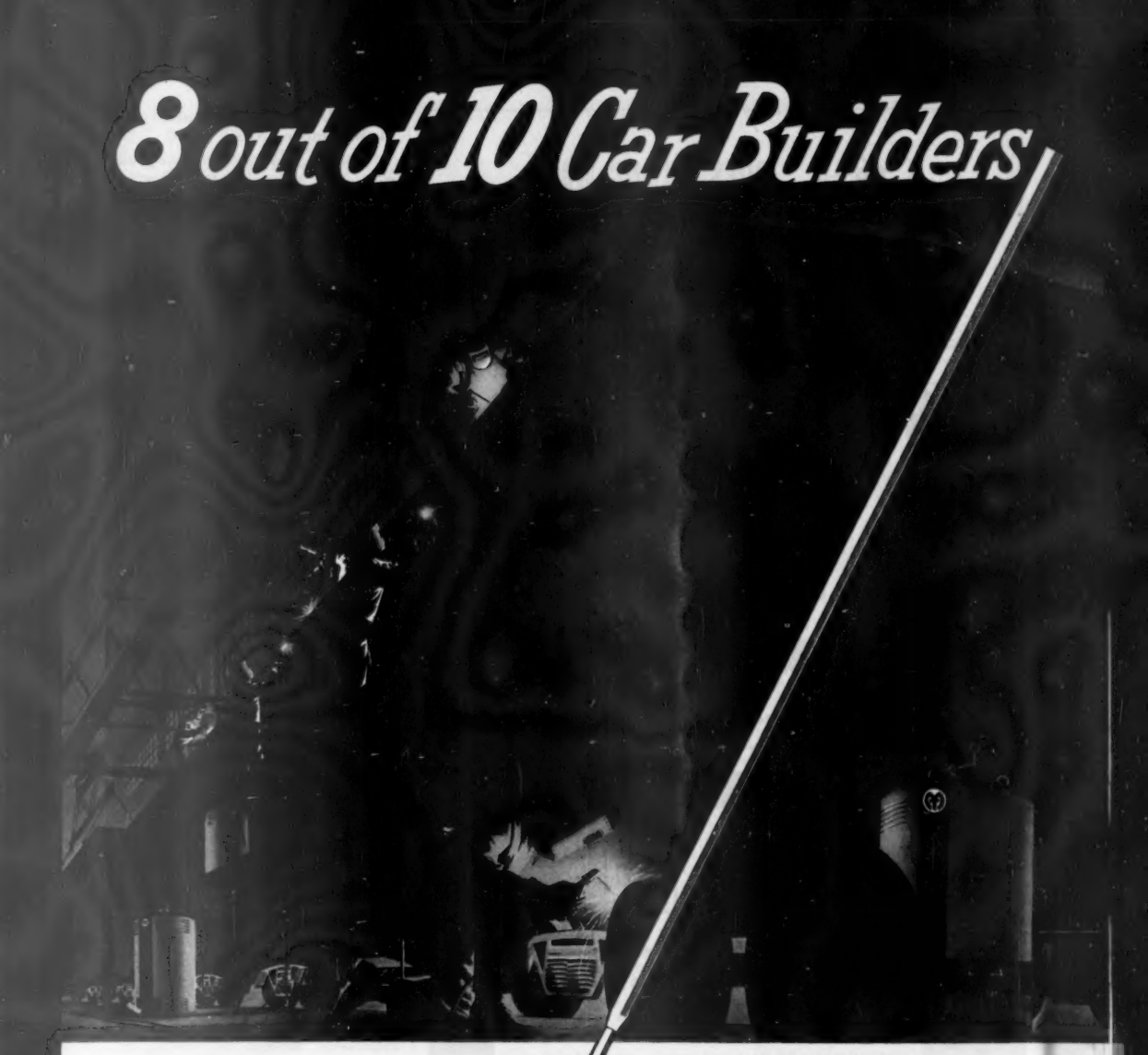
* * *

Bastian-Blessing Makes Outstanding Safety Record

A TOTAL of more than 1,701,845 man-hours free from serious accident was achieved by The Bastian-Blessing Co., Chicago, in 1950. This is based on the records of 779 employees in the Chicago plant.

Since, 1945, Bastian-Blessing has built up a grand total of more than 6,178,000 man-hours free from any serious accidents. This makes it one of the most outstanding factories in the country. The Department of Labor has in the past recognized the firm for its safety performances.

8 out of 10 Car Builders



Of the ten leading builders of railroad cars in this country, eight have long been users of Murex Electrodes.*

Alert production men in many industries prefer Murex Electrodes because they mean better, faster welding — increased production rates. And, frequently Murex provides the answer to a difficult welding problem.

*All those who have AAAA directory financial ratings

WELD WITH...

MUREX®

METAL & THERMIT CORPORATION 100 EAST 42nd ST., NEW YORK 17, N. Y.

ELECTRODES • ARC WELDERS • ACCESSORIES

GOES A LONG WAY

to eliminate weld spatter cleanup

Unsightly costly weld spatter simply wipes off, in a matter of seconds, when you brush or spray Protect-O-Metal No. 2 in the weld seam and on adjacent surfaces before welding. And you save up to 85% of weld cleaning labor, conserve man-hours for productive work. Welders like Protect-O-Metal because it contains no organic materials, cannot cause smoke, fumes, or odors. *A little goes a long way . . .* costs 1/10c per foot of weld . . . saves up to three times its cost in time savings alone. Order a trial gallon ($3.25) on a no risk basis. If you're not completely satisfied we will cancel the invoice.

PROTECT-O-METAL

POM

G. W. Smith & Sons, Inc. 5408 Kemp Rd., Dayton, O.

SAVE TACKING TIME!

Quick-acting, positive Danly KWIK KLAMPS hold pieces firmly in place for welding . . . clamping pressures up to 750 pounds maintain precision alignment. A single motion of the lever handle clamps or releases the work, saving precious production hours.

Available in 26 sizes and a wide variety of designs, KWIK KLAMPS suit almost every application. Select the style and size for your use from the booklet illustrated below.

SEND FOR YOUR KWIK KLAMP BOOKLET TODAY!

DANLY

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

PRECISION DIE SETS . . . TOOL, DIE AND GAGE MAKERS' SUPPLIES

Three Day Welding Clinic at Baltimore, April 18-20

To ANSWER metal substitution problems and other defense program questions, a three day welding clinic will be held April 18, 19 and 20 at the Baltimore, Md., warehouse of Whitehead Metal Products Co., Inc. Show hours are 12 noon to 9 p.m.

Instruction for average welders now required to do precision work, time-tried speed up techniques and welding procedures on alloy metals will be offered to visitors. Fabricators with unusual problems are invited to bring in sample pieces or to send them in for demonstrations at the clinic.

Welding demonstrations or movies will be presented covering every arc, inert-arc, gas and resistance welding and cutting technique. Representatives from Aluminum Company of America, The American Brass Co., Handy & Harman, Induction Heating Co., The International Nickel Co., Inc., Lukens Steel Co. and American Brake Shoe Co. will be present.

* * *

One Thousandth Inch Wire Spot Welded under Microscope

A WIRE less than 0.001 in. in diameter is spot welded under a 70-power microscope on the production line of the Helipot Corp., South Pasadena, Calif. The connection is made to add the nearly invisible wire to the resistance coil of a potentiometer. The microscopically welded joint is said to be wholly reliable and to eliminate shorted sections.

* * *

Stainless Tube Users Get Better Service

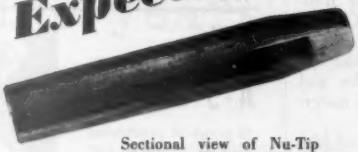
NEW air-conditioned building at the Beaver Falls, Pa., plant of The Babcock & Wilcox Tube Co. will be exclusively devoted to inspection, marking, packaging and loading for shipment of stainless tubing. The building has special lighting, air conditioning, insulation, radiant heating and rubber-matting covered passageways.

* * *

Eye Safety Guide Lists Eye Hazards

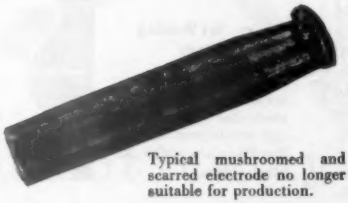
EYE-hazardous occupations and the recommended eye protection are carefully tabulated in a revised issue of the "AO Eye Safety Guide." It is illustrated and tells how protective devices are necessary in each case. Copies are available from American Optical Company branches in principal cities.

Service Beyond Expectation!

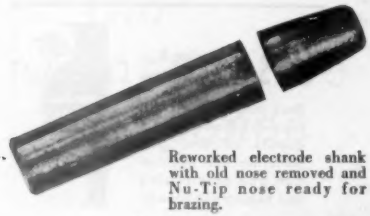


Sectional view of Nu-Tip electrode, showing fluted** water hole in new nose for superior cooling.

Mallory Nu-Tip* Spot Welding Electrode Conservation Program



Typical mushroomed and scarred electrode no longer suitable for production.



Reworked electrode shank with old nose removed and Nu-Tip nose ready for brazing.

Completed assembly with Nu-Tip nose brazed to shank —ready for long service life.

Saves Critical Copper ... Keeps Production Rolling

The latest product of Mallory research is a program for conserving copper vital to national defense, while at the same time providing Mallory customers with dependable spot welding electrodes.

Any used Mallory electrode of straight design and of any standard nose type can be given a new useful life by the Nu-Tip method—a unique process of brazing a new nose of the same class of material onto a used electrode shank. Mallory Nu-Tip electrodes have these important features:

Brazing is done with a special Mallory silver solder providing a bond of high melting point, high strength and low resistance.

Loss of hardness due to brazing is held within minimum limits.

Nu-Tip noses have fluted water holes for more effective cooling.

In exacting offset welding tests, Nu-Tip electrodes have run 30,000 welds—have withstood repeated application of 2000 pounds of force at a 30° angle.

That is service beyond expectation!

Nu-Tip electrodes closely approximate the performance of new Mallory electrodes. If you are faced with a low inventory of usable electrodes, write for technical details and prices.

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Resistance Welding Electrodes, Holders, Dies, Rod and Bars, Castings, Forgings

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Electromechanical Products
Resistors *Switches*
TV Tuners *Vibrators*

Electrochemical Products
Capacitors *Rectifiers*
Mercury Dry Batteries

Metallurgical Products
Contacts *Special Metals*
Welding Materials

*Trade Mark **Patent Pending

Saved 1 month out of 12 on re-dressing!

WEIGER-WEED

SEAM WELDING WHEELS

Actual year's closely kept record: In one of the largest tube mills: WW Seam Welding Wheels required dressing only once in every three weeks.

Wheels formerly used, had to be re-dressed every week, taking 6 man-hours. Total for year, 312 man-hours.

In the same period Weiger-Weed wheels required only 104 man-hours for re-dressing. A saving of 208 man-hours, or a full month!

This does not mean that the previous wheels were inferior in quality. Wheels of this type alloy are satisfactory on many tube mill applications. WW application engineers saw that this particular installation was different and recommended the correct WW alloy. This same service is available to you. Weiger Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Avenue, Detroit, Michigan.

Send for this free book of latest information on resistance welding.

WEIGER-WEED 12804A

Resistance Welding ELECTRODES

German, Dutch Speakers At Spanish Welding Institute

MANY foreign speakers were at the meeting of the Spanish Institute of Welding held at Madrid. Alexander Matting, ex-rector of the Technische Hochschule of Hanover, Germany and ex-chief of the experimental welding department of the German Railways delivered a talk. P. C. Van der Willigen of the Philips Works at Eindhoven, Netherlands, talked on welding with contact electrodes and the influence of hydrogen on underbead cracking.

F. Guyot, chief engineer of the boiler shop of S. A. John Cockerill, Liege, Belgium spoke on welding of machine elements. R. Verzillo, vice president of the Italian Welding Institute and chief engineer of the operating service of the Italian Railways talked about the applications of welding on railroads.

Delegates to the assembly visited several fabricating plants and research institutions in the Madrid area. The school of welding that is supervised by the Spanish Welding Institute was also toured.

Altogther some 30 papers were presented on such subjects as weldability, electrodes, research, training, residual stresses, applications, standardization and general welding information.

* * *

Murex Makes Zirconium Sheets, Rods and Wire

THE production of zirconium on a commercial scale has recently been undertaken by Murex Ltd., Rainham, Essex, British manufacturer of metals and welding equipment. The zirconium comes in sheets down to 0.005-in. thick, 6 to 7 in. wide and 2 to 3 ft long. It is useful because of its corrosion-resistant properties.

"The Arc's a little bright with the helmet up — Oh, Ed, where'd you go — Hey, Ed!"

FREE BUYERS' GUIDE

Write Wire Phone For Your Copy

War Production Information

A-S Torch Welding Alloys

32 pages of purchasing data on 31 alloys and complete range of fluxes. Bare and flux-coated rods.

A-S Arc Welding Alloys

Same catalog includes welding and cutting electrodes for ferrous and non-ferrous metals and complete range of alloy steels.

A-S Soldering & Tinning Alloys

Book also includes cast iron and aluminum solders for torch and soldering iron application and galvanizing and tinning compounds.

A-S Silver Solders

Exact information is included in this book enabling user to select the particular silver alloy to do the best job at the least cost.

• All current All-State products are covered, including those recently released. This book is a buyer's guide to the complete line.

A-S DISTRIBUTORS EVERYWHERE

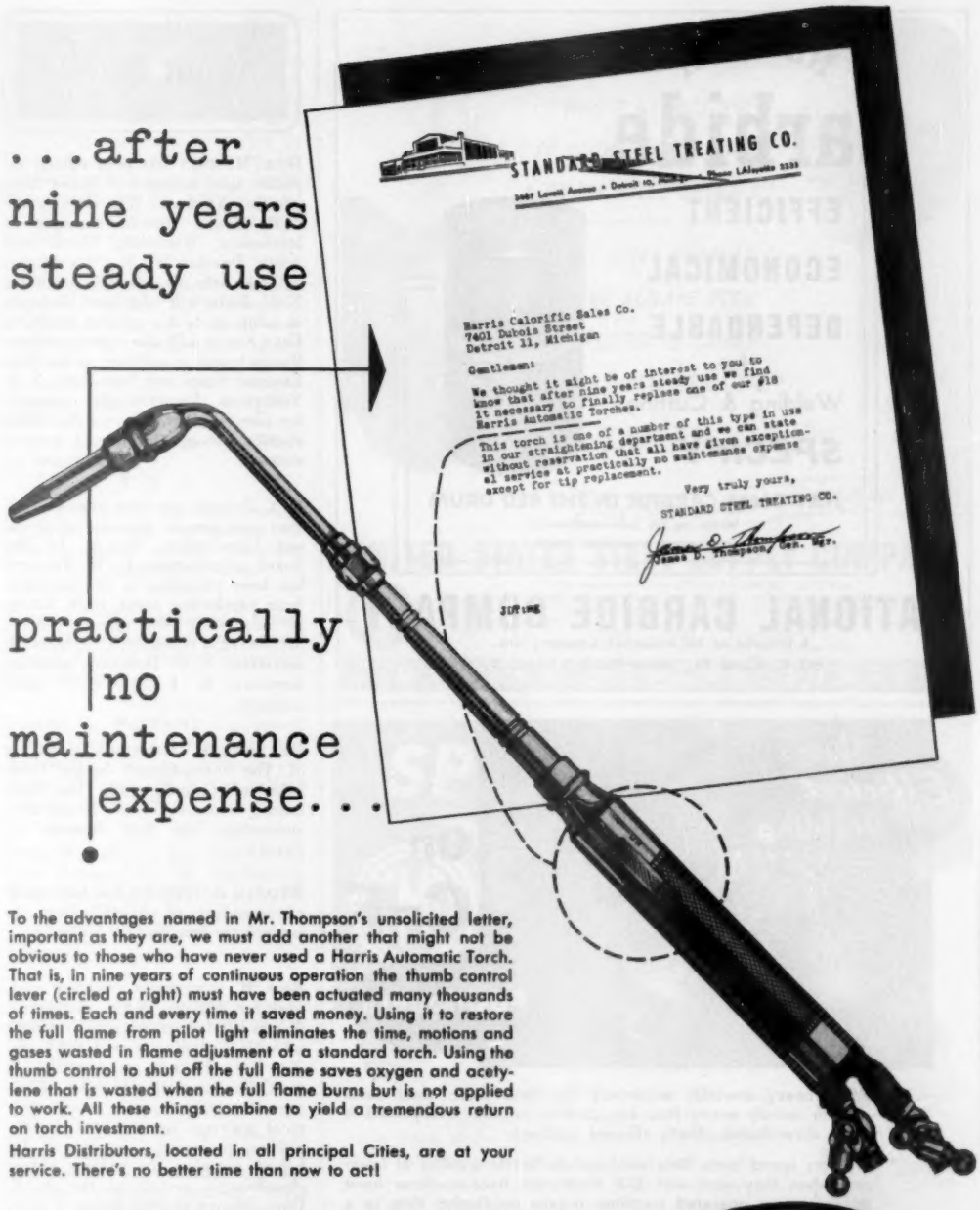
ALL-STATE

WELDING ALLOYS CO. INC.

White Plains, N.Y.

...after
nine years
steady use

practically
no
maintenance
expense...


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #18 Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

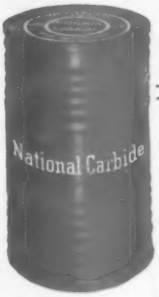
Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

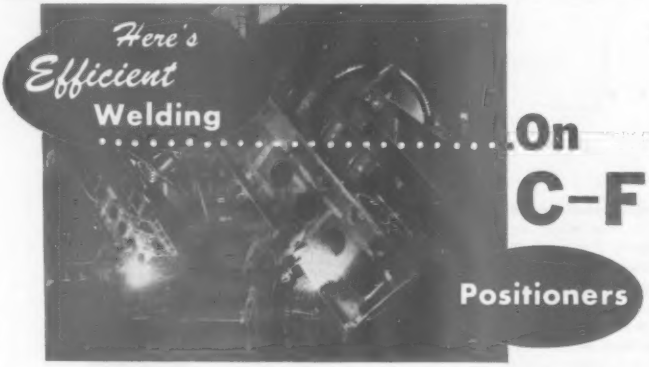
Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

National
Carbide
EFFICIENT
ECONOMICAL
DEPENDABLE
for
Welding & Cutting
SPECIFY


NATIONAL CARBIDE IN THE RED DRUM
Write us for information as to nearest available stock.
NATIONAL CARBIDE COMPANY
A Division of Air Reduction Company, Inc.
60 E. 42nd St., New York 17, N. Y.



When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made **downhand**—that's efficient welding!

Welders spend more time welding—do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP24—an illustrated circular detailing the Specific advantages of C-F Positioners.

Cullen-Friestedt Co., 1309 S. Kilbourn Ave.

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

About People

DICK METCALF has been named assistant sales manager of Miller Electric Co., Appleton, Wis. He was formerly Miller district manager in Minnesota, Wisconsin, North and South Dakota. W. H. SIEFFERMAN will take over Mr. Metcalf's territory. F. H. BECK will take over Michigan in addition to his present territory. FRED SPEAR will also cover northern Pennsylvania in addition to the New England States and New York. J. E. VOSBURGH, formerly sales manager for Glenn Roberts Co., will be Miller district manager for the 11 western states.

* * *

H. E. PIGGOTT has been named president and general manager of Dockson Corporation, Detroit, by the board of directors. C. W. PIGGOTT has been promoted to vice-president from purchasing agent. E. N. LUCKEY is general sales manager. J. F. MCDEVITT is treasurer, C. J. KOLLER, secretary; T. F. DUBUQUE, assistant secretary, R. J. NELSON is plant manager.

* * *

DR. JOHN F. THOMPSON, president of The International Nickel Company of Canada, Ltd., has been named chairman of the board also, succeeding the late ROBERT C. STANLEY.

* * *

WILLIAM A. ROBERTS, has been elected president of Allis-Chalmers to succeed the late WALTER GEIST.

* * *

Ross M. BURTHWICK, welding engineer for Williams & Co., Columbus, O. has left for service as a lieutenant on special naval duty with the Canadian Navy. He is an active member of the Columbus section of AWS. While attending Ohio State he was a technical assistant on the staff in the welding engineering department. He helped complete the welding patent classification system of the A. F. Davis library at Ohio State.

* * *

Three executive vice-presidents have been elected to newly-created posts at General Electric Co. They are HENRY V. ERBEN, HARDAGE L. ANDREWS and ROY W. JOHNSON. Their headquarters will be at the G-E executive offices in Schenectady.

THE MATTHEW ALBERT HUNTER PRIZE has been established at Rensselaer Polytechnic Institute, Troy, N. Y., in honor of Dr. Hunter, retired dean of the faculty and head of metallurgical engineering at RPI. The $2,000 fund was subscribed by 137 former students taught by Dr. Hunter, who has long been a leader in research on the weldability of metals. The prize awards will be made at June commencements.

* * *

R. T. GILLETTE, formerly with the General Electric Co., Schenectady, N. Y., and known for his development work on resistance welding and its controls, has been granted honorary membership in the American Welding Society. The northern New York Section at Schenectady presented this membership to Mr. Gillette on March 1.

* * *

JOHN T. MONAHAN has been appointed assistant sales manager of the safety products division, American Optical Co., Southbridge, Mass.

* * *

EVERETT K. MORGAN has been named general sales manager for mechanical presses of Danly Machine Specialties, Inc., Chicago.

* * *

ROBERT R. APPLEGATE has joined The Mir-O-Col Alloy Co., Inc., Los Angeles 31, Calif., as mechanical engineer. He has been in the welding industry since 1920.

* * *

JOHN W. OEHLER has been named sales manager of the Engineering Works Division, Dravo Corp., builders of welded steel river and harbor vessels and other structural steel equipment.

* * *

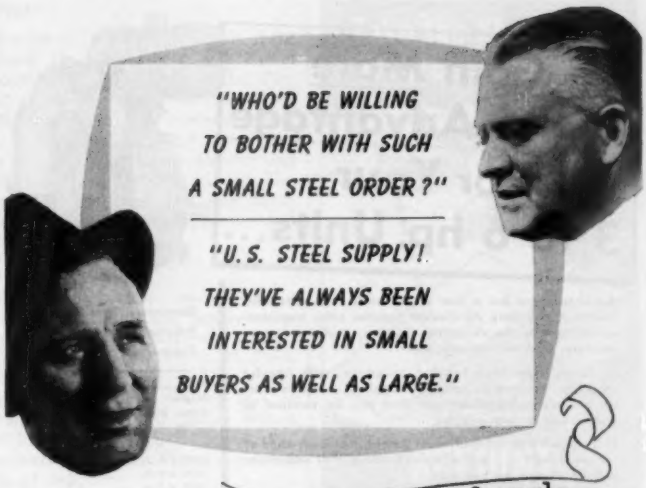
ANCEL C. ADAMS has been named general plant superintendent of The Cleveland Crane & Engineering Co., Wickliffe, O.

* * *

JOHN B. DEMPSEY has been named manager of the Detroit branch of Independent Pneumatic Tool Co. EDWARD W. KRANTZ has been appointed Pittsburgh manager. WILLIAM J. MCGRAW will take over the New York branch. CLARENCE B. BERGREN is the new Cleveland branch manager.

* * *

EDWIN E. MCCONNELL, controller of Norton Company and LEWIS S. GREENLEAF, JR., were elected members of Norton's board of directors.



...your best source of supply...

UNITED STATES STEEL SUPPLY COMPANY

Warehouses and Sales Offices: BALTIMORE • BOSTON
CHICAGO • CLEVELAND • LOS ANGELES • MILWAUKEE • MOLINE, ILL. • NEWARK • PITTSBURGH
PORTLAND, ORE. • SAN FRANCISCO • SEATTLE • ST. LOUIS • TWIN CITY (ST. PAUL)
Sales Offices: INDIANAPOLIS • KANSAS CITY, MO. • PHILADELPHIA • ROCKFORD, ILL.
TOLEDO • TULSA • YOUNGSTOWN
Headquarters Office: 208 S. La Salle St.—Chicago 4, Ill.

USS

UNITED STATES STEEL

SPEED-UP The Job with this Handy CMD CHIPPING HAMMER

TYPE EB
Head of high-grade steel combines drift and chisel. Handle has removable wire brush

With this convenient CMD Chipping Hammer you can quickly chip slag free from any weld and brush it out of the way. It is one of many styles of strong light-weight perfectly balanced hammers, with wood or steel handles in the CMD line. Order from your dealer.

Use drift to pass slag in bead

Sweep out slag with wire brush

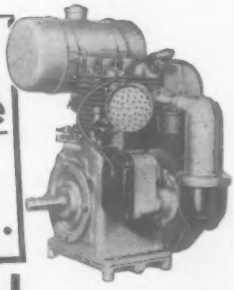
Write for FREE Booklet "How to Clean Welds"

16 pages packed with practical pointers helpful to experienced welders as well as to apprentices. Write Dept. 4-W today for your copy.

CMD

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 West 46th Street • Chicago 8, Ill.

Gain More Power Advantage for Your 3 to 6 hp. Units...



Presented here are a few of the basic facts why Wisconsin Heavy-Duty Air-Cooled Engines offer important advantages to the designing engineer, equipment manufacturer and the ultimate user:

1. Rotary type high tension magneto, with impulse coupling, mounted on outside of engine . . . operates as an entirely independent unit that can be serviced or replaced in a few minutes.

2. Self-cleaning tapered roller bearings at both ends of the crankshaft . . . will withstand side-pull or end-thrust without danger to bearings.

3. Maximum torque at usable speeds . . . most desirable on equipment that really has to go to work.

Our Engineering Department will be glad to co-operate with you in adapting Wisconsin Engines to your requirements. Write for detailed data.

Condensed Specifications
4-Cycle Single Cylinder Engines

	Model ABN	Model AKN
Bore	2½"	2⅞"
Stroke	2¾"	2¾"
Piston Displ. (Cu. In.)	13.5	17.8
HORSEPOWER		
1800 R.P.M.	2.5	3.6
2200 R.P.M.	3.1	4.5
2600 R.P.M.	3.7	5.3
3000 R.P.M.	4.2	5.9
3600 R.P.M.	4.6	6.2
No. of Piston Rings	4	
Fuel Tank Cap.	1 Gal.	
Weight, lbs.	Net	Crated
Standard Engine	76	89

MOST H.P. HOURS

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

CYC-ARC
REG. TRADE MARK

STUD-WELDING EQUIPMENT, (studs and attachments) GETS A NEW LOOK.

American engineers revamp World's original Stud-Welder for New World use.

Advanced arrangements are in hand for production of this VERSATILE, COST & LABOR SAVING production aid. (Seen at last A.S.M. Exposition, Chicago.)

- CYC-ARC PATENTED STUDS AND ATTACHMENTS COST LESS.
- ONLY CYC-ARC STUD WELDING WILL GIVE CONSISTENTLY SOUND RESULTS WITH FERROUS AND NON-FERROUS METALS INCLUDING ALUMINUM WITHOUT FUSS OR USE OF INERT GAS.
- If you require advice write with full details to:

CYC-ARC
REG. TRADE MARK

Ltd., Stelmar House
27-29 NEW NORTH ROAD,
LONDON N.I., ENGLAND

Four new vice-presidents of the Westinghouse Electric Corporation include TOMLINSON FORT, manager of the company's headquarters apparatus sales department at Pittsburgh; L. W. MCLEOD, southwestern district manager, St. Louis; EMERY W. LOOMIS, middle Atlantic district manager, Philadelphia, and L. E. LYNDE, who now heads the company's Washington, D. C. office.

* * *

GEORGE J. REED has been promoted from general manager to vice-president of Chelsea Fan and Blower Co., Inc., Plainfield, N. J., manufacturers of welding fume exhausting equipment.

* * *

D. A. COYLE has been named plant manager of The Budd Company's Charlevoix plant in Detroit. W. H. MONTEE will become works manager at Charlevoix, taking Mr. Coyle's place.

* * *

DR. ROBERT F. MEHL, head of the department of metallurgical engineering at Carnegie Institute of Technology, has been named chairman of the Metallurgical Advisory Board of the National Research Council, top government job in metallurgy.

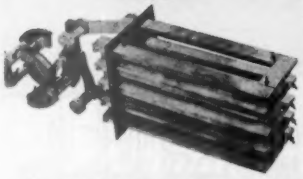
* * *

ERNEST A. DANIELS and EDWIN O. WILLIAMS have been elected to the board of directors of the Victor Equipment Co., San Francisco. Mr. Daniels' first experience in welding was in 1916 at the Bethlehem Shipbuilding Corp., San Francisco Potrero Works. Later, in the oil business, he became welding superintendent of the Associated Oil Company's Avon and Mococo refineries. He is now vice-president in charge of sales at Victor. Mr. Williams became credit manager of the Stoody Co. upon graduation from college in 1928. He came with Victor in 1930 as office manager of the Los Angeles branch. He is now vice-president in charge of the California district.

* * *

HOWARD N. SIMMS has been named director of welding development and quality control of Black, Sivalls and Bryson, Inc. Mr. Simms, with BS & B since 1936, has been active in the American Welding Society for some time, having served as vice-president in charge of the midwest district and as a member of the board of directors at the present time.

FREE EUTECTIC WELDING ALLOYS DATA FILE PROVES SAVINGS YOU CAN ENJOY IN PRODUCTION WELDING



EUTECROD 1800 DOES "IMPOSSIBLE" JOB WITH EASE. In the magnet charger shown above, 23 copper joints had to be welded without distortion, for the cumulative effect of even the slightest warpage per joint would ruin the job. This seemingly impossible metal-joining problem was easily solved with EutecRod 1800—the fast-flowing, high conductivity, high strength "Eutectic Low Temperature Welding Alloy" that welds steel, copper, and nickel units that demand distortion-free elasticity. *(Write for complete data.)*

EUTECROD 16 STRENGTHENS RESCUE LADDER CONSTRUCTION. The Curtiss-Wright "Seahawk" collapsible ladder shown in the photo is constructed in cross-sections that swing together on hinges. Previous attempts to weld the ladder joints with conventional high-heat alloys resulted in misaligned structure that rendered the ladder unsafe. This unusual metal-joining problem was solved by using new EutecRod 16 and slight design modification. *(Details on request.)* The parts thus joined remained distortion-free and strong, surpassing the rigid Navy equipment requirements.

"EUTECTIC Low Temperature WELDING ALLOYS" are setting new standards for production and maintenance welding everywhere. Drawbacks of conventional brazing and fusion welding—such as distortion, warping, porosities, and weld failures — are minimized or completely eliminated when you use EUTECTIC'S JOB PROVED hi-tensile low melting alloys.

WRITE FOR FREE PRODUCTION WELDING DATA FILE TODAY!

1940 EUTECTIC 1951

EUTECTIC WELDING ALLOYS CORPORATION

Protected Information Section

40-40 172 STREET FLUSHING-NEW YORK, N.Y.

Independent Pioneer of the Welding Industry

Died . . .

ROBERT C. STANLEY, chairman of the board of The International Nickel Company of Canada, Ltd., died Feb. 12 at the age of 74. He discovered Monel metal in 1905 and was a leader in the development of nickel uses in many other fields. A director and officer in many of the continent's biggest businesses, he also won many honors from American, Canadian and British sources.

* * *

PHILIP M. MATTERN, assistant manager, arc welding and supply sales, equipment sales department, Air Reduction Sales Co., died Feb. 26, 1951. He was 44 and very active in the American Welding Society and in teaching welding. He joined Wilson Welder and Metals Co., Inc., in 1932 and has worked for Wilson and Airco since then.

* * *

FRED EMERSON ROGERS, former editor of the Air Reduction Company publication, *The Bulletin*, died on Feb. 8. Long active in welding affairs, he was a member of the International Acetylene Association and the American Welding Society.

30 YEARS AGO

(From THE WELDING ENGINEER of April, 1921)

THE American Electric Fusion Corporation has been organized at Chicago for the purpose of manufacturing a new line of electric resistance welding machines. President of the new company is Edmund J. Henke, who has been associated with Thomson Electric Welder Co. and Federal Electric Welder Co.

—30 YEARS AGO—

FIRST annual meeting of the Canadian Welding Society was held in Montreal on March 15. Between 75 and 100 men attended.

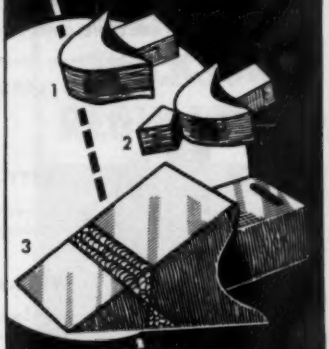
—30 YEARS AGO—

TWENTY-THREE miles of 10-in. oxy-acetylene welded pipeline were recently completed near Bakersfield, Calif., by the Midway Gas Company. Mosquitoes, marsh land, heat and high winds were some of the obstacles met during welding.

—30 YEARS AGO—

"No BOOZE fighters or wind jammers wanted." (Qualification in classified ad asking for weldors in this issue of THE WELDING ENGINEER.)

Take the Short Cut To True Economy!



REPOINT WORN SHOVEL and DIPPER TEETH with MANGANAL

U. S. Patents 1,876,738 - 1,947,167 - 2,021,945

11% - 13½% Manganese-Nickel Steel

WEDGE BARS

- WORN TEETH repointed with MANGANAL Wedge Bars cost less and usually outlast new ones.
- MANGANAL WEDGE BARS practically eliminate build-up welding time.
- MANGANAL is tough and durable . . . thrives under impact and abrasion.
- MANGANAL workhardens up to 550 Brinell . . . tensile strength up to 150,000 p.s.i.
- 23 SIZES are available to fit any worn tooth. Attach by welding with MANGANAL Bare or Tite-Kote Welding Electrodes.

FREE — Helpful Literature on the Repair of Quarry, Mining and Contractors' Equipment. WRITE TODAY!

NEAREST DISTRIBUTOR UPON REQUEST

STULZ-SICKLES CO.

SOLE PRODUCERS

92 N. J. Railroad Ave., Newark 5, N. J.

There's An Answer to Your Welding Problems at

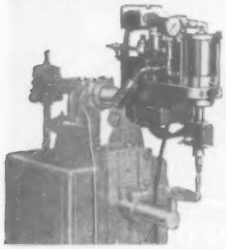
HOFFMAN-CHICAGO

RESISTANCE WELDING HEADQUARTERS SINCE 1916

Spot, Butt, Seam, Gun, Flash, Projection, Multi-Point & Stud Welders

NEW . . . USED . . . REBUILT

MANUFACTURERS OF:



BUTT-ON-SPOT

—automatic Butt Welding attachment

WELD-AIR-MATIC

—Spot Welder air conversion unit

Water-cooled, fits any spot welder with minimum horn clearance of 7". Eliminates hand clamping, upsetting and releasing.

Tests prove 10,000 welds hourly on continuous daily schedules. Eliminates manual foot operation.

DIES—complete facilities to design and build special welding dies and fixtures for your piece parts.

ACCESSORIES—complete stock of Controls, Holders, Tips & Bar Stocks.

Write for our Current Available Welder List.

ROBT. W. HOFFMAN COMPANY, INC.

40 SOUTH CLINTON STREET **CHICAGO 6, ILLINOIS**

Ruemelin Direct Pressure Blast Cabinet provides rapid cleaning action for removing rust and scale before and after arc welding operations. Handles a great variety of work. Also available in lower cost suction type unit, or with 60" diameter rotary table.

An ideal machine for production or plant maintenance work. Can use any type of abrasive, including soft-grits for electrical equipment overhaul. Write for descriptive Bulletin No. 32-B.

RUEMELIN MANUFACTURING CO.

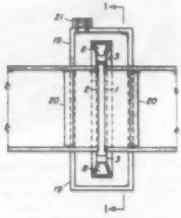
3880 N. PALMER STREET, MILWAUKEE 12, WIS.

Manufacturers and Engineers, SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

From the Patent Office

Induction Welding

2,542,393. EDWARD C. CHAPMAN, Lookout Mountain, Tenn. Assigned to Combustion Engineering-Superheater, Inc. Filed July 30, 1948. Granted Feb. 20, 1951.



Patent describes apparatus for butt welding the ends of metal tubes. It includes means for holding the tube ends in alignment with an initial spacing between them. An induction-heating conductor of narrow axial width concentrically encircles the extreme edge parts of the aligned tubes. It creates a narrow field of high frequency alternating magnetic flux that imparts inductive heating to the edges only. Means are provided for pressing the heated tube ends together to affect welding.

A housing encloses the induction-heating conductor and the tube ends. Plug-like baffles in the tubes block any escape of gas through them. A non-oxidizing gas is admitted into the housing to completely bathe the welding area. This prevents air contamination at the high welding temperatures.

* * *

Welding Machine

2,537,385. FRANK G. WIKSTROM, Valley Stream, N. Y. Assigned to Western Electric Co., Inc. Filed June 12, 1948. Granted Jan. 9, 1951.

A special welding machine includes means for feeding strip material to be welded a cutter positioned next to the welding electrode and means for moving the cutter in a straight line to cut a section from the strip and at the same time carry it across the direction of material feed. The severed section is brought into a position which is in alignment and parallel to the face of the electrode. The severed section then moves into the welding position.

HOBART
12 electrode
(E-6012)

...for use in any position with AC or DC current

What ONE electrode can handle 80% of all your production work? What ONE electrode is today's best buy for all-purpose welding? The answer to both questions is the same—the Hobart "12". It's truly a premium electrode in both quality and performance—yet actually costs you less than any other E-6012 electrode because it gives you more actual weld deposit, increased production, less clean-up time.

YOU CAN STANDARDIZE on Hobart "12"—many of the country's largest fabricators of tanks, automobile frames, agricultural implements, etc., already have. They tell us that the Hobart "12" is the most versatile electrode they have ever used. They tell us, too, that the Hobart "12" goes further—leaves more actual weld deposit per electrode because there's less spatter and less stub loss, even when higher than normal welding currents are used.

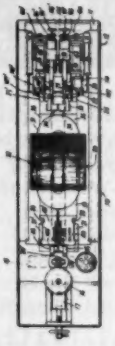
You've tried the rest . . . now try the best. Write us today for complete electrode catalog and free samples of the Hobart "12" to try on your next job. You'll be glad you did.

HOBART BROTHERS COMPANY
Box U-411, Troy, Ohio
"One of the world's largest builders of arc welders"

Simplify all your welding by using HOBART ELECTRODES

Stud Welder

2,542,093. Reidar P. C. Rasmusen, Akron, O. Assigned to The Babcock & Wilcox Co., Rockleigh, N. J. Filed Nov. 16, 1949. Granted Feb. 20, 1951.

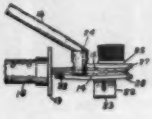


Patent refers to the resistance welding of metallic studs to a metallic plate. The apparatus includes a base, means for supporting the plate on the base and slide means mounted on the base for movement toward and away from the supporting means. A resistance welding transformer is mounted on the base adjacent the forward end. It includes a single open secondary winding mounted on the slide having its spaced open ends at the forward end. There are means for mounting a pair of studs in forwardly projecting, electrically conductive relation on the open ends of the winding. A mechanism is operable to move the slide means relative to the supporting means to engage a so-mounted pair of studs with the metallic member.

* * *

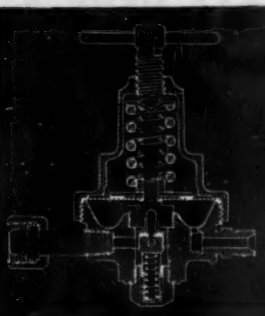
Electrode Holder

2,540,204. Claude J. Holslag. South Orange, N. J. Assigned to Electric Arc, Inc., Newark, N. J. Filed Jan. 11, 1944. Granted Feb. 6, 1951.



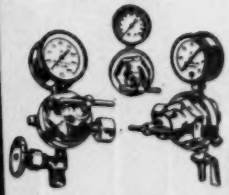
Patent covers an electrode holder for arc welding combined with a chipping hammer. The chipping hammer is fastened to the holder but is insulated from it. The securing means for the chipping tool is designed to facilitate the setting of the tool with the working edge at any desired angle with respect to the holder.

DEPEND ON DURABLE DOCKSON REGULATORS



In types for Oxygen, Acetylene, CO_2, Air, Fuel Gases.

"BUILT FOR BETTER SERVICE" with improved diaphragms, replaceable, self-aligning seats; sturdier construction; shatter-safe gauges; alert safety valves and other advantages.



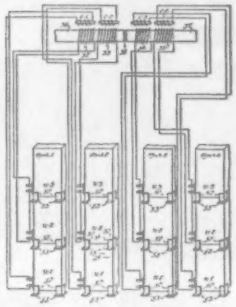
THERE IS A DOCKSON DISTRIBUTOR NEAR YOU—Let us send you his name and our complete catalog of DOCKSON WELDING and CUTTING EQUIPMENT.

Dockson CORPORATION
3839 WABASH • DETROIT 8, MICH.

CYLINDERS
FOR
ALL GASES
10 C.F.
40 C.F.
60 C.F.
100 C.F.
150 C.F.
250 C.F.
300 C.F.
340 C.F.
INDEPENDENT Acetylene Cylinders take from 5 to 10% more gas. Uniformity of monolithic filler insures even distribution of acetone. Storage cylinders available in 12' and 20' lengths, of 850 and 1,500 cu. ft. capacities.
INDEPENDENT ENGINEERING COMPANY, Inc.
Manufacturers of
CONSULTING • DESIGNING • RESEARCH
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE • OXYGEN • HYDROGEN • NITROGEN
O'FALLON 5, ILLINOIS
We Invite Your Inquiries

Induction Welding

2,540,219. HARRY B. SMITH, Narberth, Pa. and GEORGE A. DOLAN, East Orange, N. J. Filed Dec. 19, 1946. Granted Feb. 6, 1951.

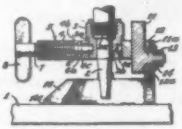


Patent refers to the process of welding together two metal workpieces abutting each other. The method includes applying two separate windings in tandem around adjacent parts of each member on opposite sides of the abutment. Alternating current of a suitable strength is passed through the windings to establish alternating electro-magnetic fields around the parts. This first induces preheating in the metal parts. Arc welding of the two pieces is then accomplished with the current cut off on only the two windings nearest the joint. After the weld is completed, the current is turned back through these latter windings at a certain strength to heat treat the weld.

• • •

Cutting Torch Holder

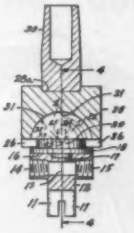
2,542,473. LOUIS K. BULLMAN and SHIRL UNDERWOOD, Norfolk, Va. Filed March 18, 1949. Granted Feb. 20, 1951.



A newly patented holder for cutting torches is adapted to slide on the surface of the work. It has a pair of runners and a cradle above and between them for holding a torch tip. The spaced runners have lateral surfaces for following a template. A protractor attachment provides means for angularly adjusting the cradle in relation to the work. There are also means for vertical adjustment of the cradle.

R-W Electrode

2,540,180. JOHN R. WIRT, Anderson, Ind. Assigned to General Motors Corp., Detroit, Mich. Filed Oct. 29, 1949. Granted Feb. 6, 1951.

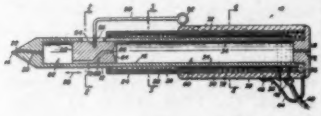


Patent refers to a spot welding electrode having two parts, one with a spherical socket and the other with a spherical part. The spherical shape has a groove around it and diametrically opposite notches extending from the groove and parallel to its axis. The members are kept in loosely assembled relation. This is accomplished by plates attached to the socket member and fitting into the groove on the spherical members. They support the spherical part with its center of curvature slightly offset from the center of curvature of the socket. The plates have lugs received by the notches so that rotation of the spherical member to the socket is limited.

* * *

Soldering Iron

2,538,474. WALDEMAR P. SCHIFFLEGER, Wauwatosa, Wis. Filed Nov. 22, 1948. Granted Jan. 16, 1951.



Patent refers to a soldering iron having a tubular body and a chamber for liquid solder. A conical soldering tip is provided at the front end of the body. A solder outlet passage is in communication with the chamber. The rear end of the body is a handle. A removable filler plug is provided at the rear end of the body. It has a vent aperture in communication with the chamber. A reciprocable plunger is positioned intermediate the ends of the chamber and separates the latter into front and rear compartment. The body has in its lateral wall a longitudinal slot covered by the plunger. An L-shaped actuating rod is secured at one end to the plunger and extends outwardly through the slot.

PIGTAILS
FOR INSTANCE

Bushels of pigtails for condensers, resistors, batteries, etc., are now...

PRECISION WELDED WITH EASE
by RAYTHEON WELDPOWER* UNITS

Photo shows a typical application — a 0.025"dia. tinned copper pigtail welded to a light gauge brass cap. The new Raytheon Model G. Weldpower Head and Raytheon Condenser Weldpower Control Units make possible high speed precision assembly of small parts involving dissimilar non-ferrous metals. Ask us to show you how Raytheon Condenser Weldpower can be applied to your assembly problems. Or write for complete information.

Address Dept. WE-4

Raytheon Condenser Weldpower Control Units, complete with Model G. Weldpower Head are available in 63, 225 and 1080 watt-second capacities.

*Reg. U. S. Pat. Off.

RAYTHEON

Excellence in Electronics

RAYTHEON MANUFACTURING COMPANY

WALTHAM 54, MASSACHUSETTS

Production Welders Locate and HOLD with "DE-STA-CO" clamps

Revised 32-page catalog of toggle clamps, accessories, applications. Template sheets for efficient fixture design.

Precision clamp manufacture and high holding-pressures are the "secret" of this efficient welding fixture. Locating pins welded to clamp bars hold channels in positions to weld variable length assemblies in this versatile fixture. "De-Sta-Co" reamed holes and hardened pins assure accurate positioning of parts. Positive holding pressure forces cross members and plates into close contact essential for strong production welding. And "De-Sta-Co" quick toggle action makes loading a job untrained workers, even women operators, handle with ease, in seconds.

More than forty "De-Sta-Co" models—including new portable and plunger clamps—offer quick solutions to your locating and holding problems. The "De-Sta-Co" stocking distributor in your area is qualified to assist you; call him in, or, if you haven't met him, write for his name and your copy of our catalog, today.

DETROIT STAMPING COMPANY

372 MIDLAND AVE. • DETROIT 3, MICHIGAN

BECKER

Any Size
Any Type
Any Grade

A complete line of Welding Brushes for ALL types and makes of Welding Equipment —Keen-Arc Carbons for twin-arc torches—carbon and graphite welding electrodes—carbon rods, plates and paste . . . plus the facilities and engineering staff to produce any electrical or mechanical carbons to your specifications. Write for catalogs.

BECKER BROTHERS CARBON CO. 3459 S. 52nd Ave., Cicero, Ill.

CARBON

An Unbeatable Combination!

SILVALOY SILVER BRAZING ALLOYS

The Silvaloy group consists of 7 popular silver brazing alloys high in tensile strength and producing strong, ductile joints on ferrous and non-ferrous metals.

	SILVER CONTENT	MELTING POINT	FLOW POINT
SILVALOY 50	50%	1160 F	1175 F
SILVALOY 45	45%	1125 F	1145 F
SILVALOY 40	40%	1135 F	1205 F
SILVALOY 35	35%	1125 F	1295 F
SILVALOY 20	20%	1430 F	1500 F
SILVALOY 15	15%	1185 F	1280 F
SILVALOY 503	50%	1195 F	1270 F

1200 All-Purpose Flux—for use on all metals. No. 1200 Flux readily dissolves oxides during brazing operations and aids in the flowing of the alloy. Meets all government specifications.

1100 Low Temperature Flux—superior where exceptionally clean surfaces on copper or copper alloys are required at lower temperatures.

COMPLETE STOCKS

Oxy-acetelyne welding rods and flux for cast iron, steel, aluminum, brass, copper, bronze, nickel, monel and inconel.

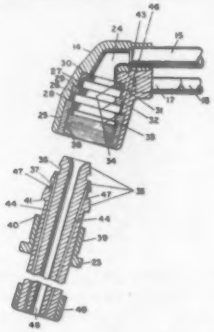
STEEL SALES CORPORATION

3348 SOUTH PULASKI ROAD • CHICAGO, ILLINOIS

BRANCH PLANTS: Detroit, St. Louis • BRANCH OFFICES: Milwaukee, Minneapolis, Grand Rapids, Indianapolis, Kansas City, Mo.

Welding Torch

2,538,916. JACOB P. RUDOLPH, North Arlington, N. J. Assigned to Air Reduction Co., Inc. Filed June 11, 1048. Granted Jan. 23, 1951.

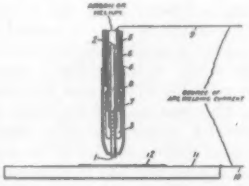


Patent covers a gas welding torch combining a head and a tip having a conical end portion adapted to be inserted in the head. The tip has an encircling groove. Ring-shaped inserts are positioned in the head in parallel spaced relation and have tapered inner faces forming seats for the conical parts of the tip at opposite sides of the groove. There are means for clamping the tip in the head with the conical parts of the tip seated on the tapered inner faces of the inserts. The encircling groove in the tip and the two ring-shaped inserts thus form an annular gas chamber. There are means for supplying a gas to the annular gas chamber. At least one jet passage in the tip communicates with the annular gas chamber.

• • •

Inert Arc Electrode

2,540,811. JAMES D. COBINE, Schenectady, N. Y. Assigned to General Electric Co. Filed March 30, 1950. Granted Feb. 6, 1951.



A new non-consumable electrode for inert-gas-shielded arc welding is made of tungsten having of a core material selected from the group of thoria, ceria and cesium oxide. This electrode is said to have instant arc starting and stable operating characteristics because a stable cathode spot is formed at the arcing terminal.

One Hand Pickup "Jumbo" Goggles

No. 610 Welding Goggles Fit Over Prescription Glasses

One piece construction permits putting on or taking off with one hand. Adjustable to fit any face. Frame is of tough featherweight, flexible grey plastic. Rolled edges, perfect balance and light weight (only 2½ oz.) assure wearing comfort and popularity with welders. Thoroughly ventilated through a series of light-proof vents at sides and back of lenses.

Furnished with 50 m/m lenses of any desired style and density.

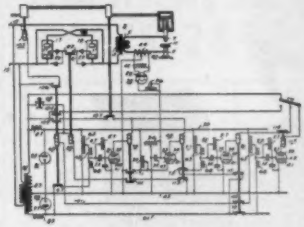
Order from Your Dealer

Ask your dealer for the Sellstrom No. 610 Jumbo size Welding Goggles. If he cannot supply you, write us for the name of a nearby dealer who has them in stock ready for immediate delivery.

sellstrom
MANUFACTURING COMPANY
More Than 200 Eye and Face Safeguards
626-D N. Aberdeen St., Chicago 22, Ill.

Weld Timing Circuit

2,532,111. Richard L. Longini, Pittsburgh, Pa. Assigned to Westinghouse Electric Corp., East Pittsburgh, Pa. Filed June 12, 1948. Granted Nov. 28, 1950.

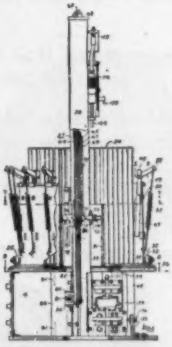


Patent pertains to a timing apparatus for controlling the supply of welding current to a load requiring different quantities of power under varying conditions. It consists of the following items in combination: terminals for supplying a potential, a first variable resistor connected to the terminals, a second resistor and a capacitor in parallel connected to the first resistor and one terminal. In the circuit there is a valve which becomes conductive when the capacitor is charged to a predetermined potential. A relay is connected to the valve. The relay device includes a mechanism that stops the flow of load current when current flows through the valve.

• • •

Automatic Arc Welding

2,531,181. Wayne E. Wilson, Fitchburg, Mass. Assigned to General Electric Co. Filed Dec. 2, 1948. Granted Nov. 21, 1950.



Automatic arc welding apparatus includes a device for lengthwise feeding of a continuous column of unit length electrodes welded together end to end. A guide supported in a fixed position relative to the feeding means has a surface that locates the unit length electrodes held in side engagement therewith in end alignment with the welded electrode column in the feeding device. A supply of unit length electrodes is held opposite the surface of the guide and in side by side relationship.

FREE EUTECTIC WELDING ALLOYS DATA FILE PROVES SAVINGS YOU CAN ENJOY IN MAINTENANCE WELDING

SALVAGE WELDING TIME CUT MORE THAN 90% WITH NEW EUTECTIC WELDING ALLOYS

When a leading research institute's tensile testing machine was overloaded, the top snapped completely off the two side members. At first, the old-fashioned conventional high heat fusion methods were tried. The entire operation—pre-heat, slow cool, etc.—consumed 48 hours in all; and, on the first day after its repair, the casting cracked wide open again, through and alongside the welding area. It seemed as though the entire casting would have to be scrapped. Before taking this costly step, Eutectic was consulted . . .

The damage was repaired permanently with EUTECTIC's BIG TEAM — CutTrode + EutecTrode 24, for cast iron. CutTrode—a new special metallic-arc oxygen-less cutting electrode first beveled the breaks, in preparation for welding. Sufficient residual heat remained from the use of CutTrode to weld the entire job without any further pre-heat. The breaks were first tack welded; then stringer beads were deposited with new EutecTrode 24. The entire job—permanently welded—was accomplished in only 4 hours—1/12 *THE ORDINARY WELDING TIME!* (Complete details and photos of this job available on request.)

"EUTECTIC Low Temperature WELDING ALLOYS" are setting new standards for production and maintenance welding everywhere. Drawbacks of conventional brazing and fusion welding—such as distortion, warping, porosities, and weld failures — are minimized or completely eliminated when you use EUTECTIC'S JOB PROVED hi-tensile low melting alloys.

WRITE FOR *FREE* MAINTENANCE WELDING DATA FILE TODAY!

1940 EUTECTIC 1951

EUTECTIC WELDING ALLOYS CORPORATION
Technical Information Section
40-40 172 Street Flushing-New York, N. Y.
Independent Pioneer of the Welding Industry

THIS MAN WOULDN'T NEGLECT

A MACHINE IN HIS PLANT

...yet he hasn't had a Chest X-Ray!

He checks every piece of mechanical equipment he owns for wear, lubrication, efficiency.

Yet he fails to take the simple precaution of a Chest X-Ray to make sure he does not have tuberculosis. *Not because he's opposed to the X-Ray. Simply because he is not sufficiently informed—or just hasn't taken the time and trouble, or does not realize the seriousness of the problem.*

A Chest X-Ray is the first step toward detecting tuberculosis in its early stages. And in its early stages it can be cured with the least loss of time from work.

So, if you're the man above, that one simple reason should make you get your Chest X-Ray—*today*. But listen, see how serious this really is:

Between the ages of 15 and 34, tuberculosis leads all other diseases as a cause of death—although at no age are you safe from TB. Yet, if everyone does his part by getting a Chest X-Ray periodically, and the majority of cases thus discovered are followed up, we can eliminate TB entirely as a public health hazard!

Will you do your part today? Get a Chest X-Ray. It may mean your life!

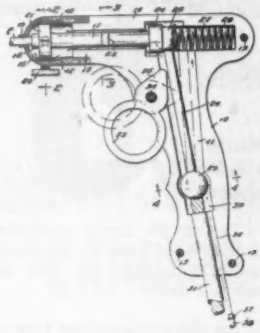
A PUBLIC SERVICE PROJECT THE ADVERTISING COUNCIL

Published in the public interest by:

McGRAW-HILL PUBLICATIONS

Electrode Holder Switch

2,538,245. GUSTAVE HILLER, Los Angeles, Calif. Assigned to Edward R. McHugh, Los Angeles. Filed Oct. 19, 1946. Granted Jan. 16, 1951.



Newly patented energizing control for welding electrode holders includes a body of insulating material, a stationary contact on the body and an elongated conducting member comprising a pair of spaced spherical conductors connected by a rigid-neck conducting portion. The body has a socket to receive one of the spherical conductors to swingably mount the elongated conducting member to permit swinging movement of the other spherical conductor toward the stationary contact for circuit making purposes and away from the stationary contact for circuit breaking. A coil spring recessed in the body and engaging the other spherical conductor urges the same toward the stationary contact. It is restrained from lateral movement at the engaging end thereof by its fit on the spherical surface of the other spherical conductor. Means are provided for swinging the conducting member against the resistance of the coil spring. There are also devices for connecting an electric supply cable to the one spherical conductor.

* * *

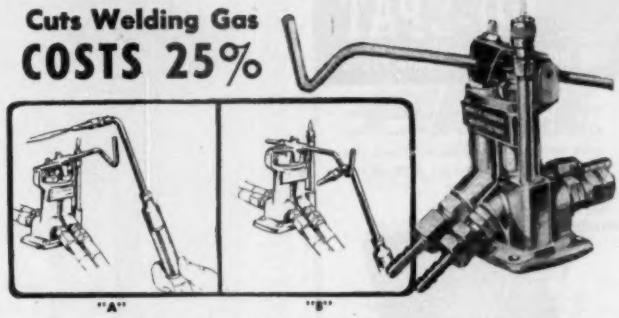
A-C Arc Welder

2,529,715. JOSEPH M. TYRNER, New York City and NELSON E. ANDERSON, Scotch Plains, N. J. Assigned to Air Reduction Co., New York City. Filed Sept. 30, 1948. Granted Nov. 14, 1950.

Patent pertains to an a-c arc welding system that eliminates harmful effects in the transformer ordinarily caused by partial rectification of the current in the arc. Normally, said rectification causes a d-c component of current in the secondary that cuts down its operating efficiency. This solution includes inducing an auxiliary alternating current from the primary and then rectifying the auxiliary alternating current.

Weldit INC SINCE 1918 GASAVER

Cuts Welding Gas COSTS 25%



"A" "B"

The famous Weldit Gasaver Model E, the original gas saving unit reduces gas consumption 25%. Case histories throughout industry prove this economy.

The Weldit Gasaver automatically shuts off the torch flame between welds. See illustration shown above . . . "A"—shows the ignited torch about to be hung on the lever rod of the Gasaver; "B"—when the torch is hung in place the flame is automatically extinguished. To relight, lift torch off lever rod, pass over pilot light which instantly ignites it to a predetermined flame.

The Weldit Gasaver increases production and cuts fire hazards.

WELDIT TORCHES . . . FOR THE MAN WHO CARRIES THE TORCH

992 OAKMAN BLVD.

Weldit INC SINCE 1918

WRITE FOR BULLETIN NO. 10A.

DETROIT 6, MICH

CANADIAN DISTRIBUTORS • ALLOY METAL SALES • 881 BAY ST. • TORONTO 5, ONT.

Safer...at no added cost

Meco

Safe-T-Chek REGULATORS

The MECO Safe-T-Chek is the only regulator with a *built-in*, self-actuating safety valve that controls excessive pressures due to careless handling or failure of seating. This *built-in* safety feature comes to you at no additional cost. See your MECO Dealer TODAY.

FREE—Write for your copy of the NEW MECO Catalog No. 140 TODAY.

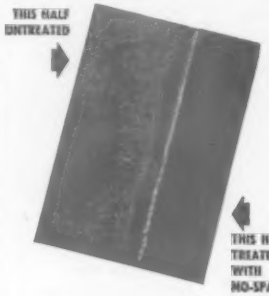
Meco "Always specify MECO... the finest in the field"

Modern Engineering CO., Inc.

3411-D PINE BLVD. ST. LOUIS 3, MO.

SAVES TIME
SAVES LABOR
SAVES MONEY
NO-SPAT
THE NON-TOXIC WELDING FLUID

NO-SPAT eliminates slow, costly cleaning. Keeps adjoining surface spatter-free. Prevents rust, keeps welding jigs clean. No carbon monoxide. Send for FREE sample.



The Midland Paint & Varnish Co.
3803 E. 91st St. • Cleveland, Ohio

W-AL-CO RODS
for Welding of ALUMINUM
ELECTRIC AND GAS WELDING

Drawn Wire
TYPES 25, 43 and 52
Brazing 716

FOR CAST ALUMINUM
Use Extruded Rods
Types 142, 195, 355 and 356
for Better Welding
3/16" size only

Aluminum Solder
White Metal

Welding Alloys Manufacturing Co.
744 Broad St. Newark 2, N. J.

NEW PRODUCTS

(Continued from page 46)

New Wilson A-C Welders Insulated by Silicones

THE new 300, 400 and 500 amp Wilson "Bumblebee" a-c welders feature silicone insulation for both indoor and all-weather models. For inside use, the silicone insulation means safe operation at high temperatures; outside, it shields from water. In addition, this type of insulation is light enough not to interfere with the portability of welders mounted on wheels.

Current ranges are 30-375 for the 300 amp model, 80-400 for the 400 amp model and 100-675 for the 500 amp model.

AIR REDUCTION SALES CO., 60 East 42nd St., New York City 17.

* * *

G-E Thoriated Tungsten for Inert-Arc Welding

CONSIDERABLE cost reductions in inert-gas-shielded arc welding can be realized with new tungsten electrodes containing thorium, according to General Electric Co. Major application of the new electrode will be with d-c straight polarity operations.

"Hi-Thoria" electrodes are said to produce a stable arc over a wide range of currents.

Touch starting can be easily managed with currents as low as 5 amp, it is claimed. The new electrodes are manufactured in three to 24-in. lengths and from 0.040 to ¼ in. diameter.

These thoriated tungsten electrodes are not recommended as a replacement for reverse polarity d-c operations, a-c inert arc or atomic-hydrogen welding.

WELDING DIVISIONS, GENERAL ELECTRIC CO., Fitchburg, Mass.

"Red Head"
WELDING CLAMPS
• Designed for Welding •
Made to take abuse

1. Threads are always protected from weld spatter, and never exposed to damage in open or closed position.

2. The clamp body is cut from a solid plate and heat treated to give greater resistance to bending or twisting.

3. Heat treated chrome molybdenum alloy handle offers great resistance to bending.

23 STOCK SIZES

CHICAGO BOILER COMPANY
1900 Clybourn Ave. Chicago 14, Illinois

SPECIAL GLOVE DEVELOPMENT BY
RACINE

THREE STYLES
• 380 Horsehide
• 384 Pearl Carpincho (wildpig)
• 386 Cowhide

Chrome tanned Heat Resistant Split Leather—Heat Breaker Back Lining—LARGE size—
1. One piece back.
2. One piece palm.
3. Thumb seam protected by wide leather strap.
4. All vulnerable seams welted.
5. Palm side of thumb is protected by extra leather overlay.

• Send for booklet on these and other GARDSMEN Protective Equipment.

RACINE GLOVE COMPANY, INC.
RIO, WISCONSIN

BUY
SELL
USE
SHAWINIGAN
CARBIDE

SHAWINIGAN
PRODUCTS
CORPORATION
EMPIRE STATE BUILDING
NEW YORK 1, N. Y.

after you've read this magazine

. . . and clipped pertinent ideas, articles and advertisements for reference, *please do not burn or throw it away.*

Here are two sound reasons why:

1) Wastepaper can help to swell the funds of your local Boy Scout Troop, your church or other community organization. It gets a good price these days.

2) Whether in magazine form or not, wastepaper helps to fill the increasing need for paper pulp brought on by the mobilization effort.

Collect it. Give it to your favorite organization. Chances are they have scheduled pick-ups.

Flash-Butt Welder Joins Metal Chairs

BOTH ends of a tubular chair rung are welded to the tubular legs of metal chairs by a compact flash-butt welder. Operation is simple and automatic and high quality welds can be obtained consistently, states manufacturer.

Rated at 75 kva and wired for operation on 220 or 440 volts, the machine includes two vertical air clamps for holding the tubular rungs in the lower dies. An air cylinder actuates the gear and rack mechanism that interconnects the right and left platens for automatic flashing and upsetting.

One chair can be welded in ten seconds. Including loading and unloading time, a rate of 300 chairs per hour is possible.

SCIAKY BROS., INC., 4915 West 67th St., Chicago 38.

• • •

New Non-Nickel Base Cast-Iron Welding Rod

IF nickel-base electrodes become hard to get for salvage and production work on cast iron shapes, the new All-State No. 3 (copper coated) cast iron welding and brazing rod can be substituted. It is applied with All-State No. 1 cast iron flux and a neutral oxyacetylene flame. Large castings to be repaired should be entirely preheated to about 800 F.

Weld deposit of the new rod has a tensile strength as high as 48,000 psi with a Brinell hardness of 170-200. It is color-matching and has a working temperature of 1,400-1,500 F. Its copper coating is said to prevent rusting in storage and also helps its excellent flow characteristics.

ALL-STATE WELDING ALLOYS CO., INC., 273 Ferris Ave., White Plains, N. Y.

PIERCE
"First Name" in
GOVERNORS
•
PIERCE
SERVO
GOVERNORS
•
BELT-DRIVEN UNIVERSAL
TYPES FOR ALL ENGINES
Special Governors for Chevrolet, Ford, Chrysler, Willys and most other standard engines.
•
See Your Welding Supplies Dealer or write to
THE PIERCE GOVERNOR CO., INC.
1607 Ohio Ave. Box 1000 Anderson, Indiana

METAL BOND
SOLDERING
and
WELDING
PRODUCTS
—the choice of successful welders
SEAL-X-O
A preparation used for sealing air holes on electric welds on water jackets, etc. Can be used as a filler over rough welds. Where no tensile strength is needed it has many uses. This and all METAL BOND products can help you make more money on every welding job.
• Send for our pocket-size catalog. Contains information on welding, brazing, and soldering with descriptions of money-saving METAL BOND Products.
METAL BOND MFG. CO.
3201 KOSSUTH AVE.
ST. LOUIS 7, MISSOURI

It's time we got *working* mad!

As we listen to the latest insults from Moscow, we're likely to get fighting mad.

Instead, we'd better use our heads and get *working* mad.

It is clear by now that Stalin and his gang respect just one thing—strength. Behind the Iron Curtain they've been building a huge fighting machine while we were reducing ours. Now we must rebuild our defenses—*fast.*

As things stand today, there is just *one* way to prevent World War III. That is to re-arm—to become strong—and to stay that way!

This calls for better productivity all along the line. Not just in making guns, tanks and planes, but in turning out civilian goods, too.

Arms must come first. But we must produce arms *at the same time* we produce civilian goods.

We can do this double job if we all work together to turn out more for every hour we work—if we use our ingenuity to step up productivity.

All of us must now make sacrifices for the common good. But we're working for the biggest reward of all —*peace with freedom!*

THE BETTER WE PRODUCE THE STRONGER WE GROW

A PUBLIC SERVICE PROJECT · THE ADVERTISING COUNCIL

FOR A FREE COPY OF "THE MIRACLE OF AMERICA"

MAIL THE COUPON to Public Policy Committee, The Advertising Council, Inc., Dept. B.P., 25 West 45th Street New York 19, N. Y.

*Name*_____

*Address*_____

McGRAW-HILL PUBLISHING COMPANY

WHERE TO BUY

6714 Bryn Mawr Ave.

SEARCHLIGHT SECTION

ASSISTANT WELDING RESEARCH ENGINEER

Recent graduate, metallurgical or electrical engineer with welding training. Excellent opportunity for advancement. Research and development in welding processes, design and application of mild steel, low-alloy steel, aluminum and stainless steel. Transition temperature studies. Applicant must be resourceful.

PULLMAN STANDARD CAR MANUFACTURING COMPANY
Research and Development Department
1414 Fields Street
Hammond, Indiana

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS WANTED

SALES ENGINEER, familiar with all phases of gas and arc welding, desires position with manufacturer or distributor of gas or arc welding equipment and supplies. Twenty years experience in servicing consumers, preparing advertising, establishing distributors and directing sales. PW 9087, Welding Engineer.

WELDING OR Maintenance Supervisor man with 23 years experience in mechanical and welding maintenance or welding supervisor in a progressive company. PW 9217, Welding Engineer.

WELDING SUPERVISOR, experienced with all types of manual and automatic arc and gas welding on steel, nickel, copper and aluminum, desires a position with a progressive metal fabricator in a supervisory or engineering capacity. PW 9088, Welding Engineer.

MECH. ENGINEER. 15 yrs. experience (10 yrs. supv. & exec.). Solid background in welded fabrication field including estimating, methods, and tooling for jobbing and production. Position desired, making best use of above, in supervisory or executive capacity. Age 33, family, ex. health. PW 9297, Welding Engineer.

PATENTS

Consultant: Z. H. Polachek
Reg. Patent Attorney
1234 Broadway, New York 1, N. Y.

WE BUY AND SELL SURPLUS
WELDING ROD
OF EVERY DESCRIPTION
WRITE — WIRE — PHONE
H. LEHMAN & CO.
44 Dobbin St. Brooklyn 22, N. Y.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** EQUIPMENT: USED OR RESALE

STAINLESS STEEL ELECTRODES

17,500	3/32"	Page	18-8
350	3/32"	Surewald	18-8
700	3/32"	Arcos	19-9
50	3/32"	Page	25-20
4,050	1/8"	Airco	18-8
850	1/8"	Murex	18-8
10,500	1/8"	Page	18-8
800	1/8"	Arcos	19-9
3,500	1/8"	McKay	19-9
13,500	1/8"	Arcos	25-20
26,100	1/8"	Alloyrod	19-9
8,200	5/32"	Page	18-8
10,350	5/32"	Airco	19-9
15,350	5/32"	McKay	19-9
2,050	5/32"	Arcos	25-20
4,900	5/32"	Murex	25-20
1,700	5/32"	P & H	25-20
2,800	5/32"	Raco	25-20
3,000	5/32"	McKay	19-9
18,000	5/32"	Murex	25-20
395	3/16"	Mac-Tite	19-9
24,750	3/16"	McKay	19-9
6,250	3/16"	P & H	19-9
1,300	3/16"	Surewald	19-9
3,135	1/4"	Lincoln	19-9

1,700,000 lbs. Surplus Mild Steel Electrodes.
WRITE OR WIRE FOR PRICES
INDUSTRIAL AIR PRODUCTS CO.
3200 N. W. Yeon Avenue
Portland 10, Oregon

NEW SPOT WELDER FOR SALE

90 KW Sciaky Stored Energy Spot Welder Type PMCO.4S10. Throat depth ¾". Capacity 2 thicknesses .032" to .125" aluminum. Including rectifier 440 volt, 3 phase, 60 cycle. Never used. Still on original skid. Will sacrifice.

REVERE COPPER AND BRASS INC.
Chicago Manufacturing Division
2200 N. Natchez Avenue
Chicago 35, Illinois

WELDING HOSE

Oxygen, acetylene, or air hose, 25' length, ¼" I. D. with couplings—$2.25 per length.
Parcel Post Prepaid. Rated firms: net 10 days. Others: Cash with order or C.O.D.
Satisfaction guaranteed.
Saxon Rubber Company
438 Larimer St. Denver 4, Colo.

1948 Sciaky 500 KVA 3 phase Seam Welder. Specialists in New and Used Spot, Butt, and Seam Welders.
$250,000 Inventory in Stock.
Buy or Sell.
MORRIS BROS.
12934 Evergreen
Detroit 23, Mich. Vermont 8-7360

OXYGEN CYLINDERS

2,000 Used Reconditioned and Tested
220 cu. ft.—write for details.
INDUSTRIAL AIR PRODUCTS CO.
3200 Yeon Ave., Portland 10, Oregon

FOR SALE
40 Meter Oxygen Column
7 HP drying batteries and 2 HP purge batteries.
For details write
FS 9139 Welding Engineer
520 N. Michigan Ave., Chicago 11, Ill.

BRONZE WELDING RODS FOR SALE

7500 pounds 3/16" No. 1232 SILICON BRONZE WELDING RODS MFG. BY BRIDGEPORT BRASS COMPANY.

WELDING RODS IN ORIGINAL CONTAINERS
PRICED TO SELL

AMERICAN ARC WELDERS, Inc.
ROSEAU, MINN.

O RINGS WELDING SEALS

IMMEDIATE DELIVERY FOR VICTOR GAS WELDERS

Ring Size Inside Diam.	Victor Number	Money-Saving Price
1/8"	JR 3	$4.00 per 100
5/16"	JR 4	$4.00 per 100
1/4"	DR 1	$4.00 per 100
7/16"	DR 2	$4.00 per 100

Packed in lots of 100 per size. Prepaid postage to your warehouse in any city. Other sizes available upon request. Specification orders manufactured.
Send Orders to
GEORGE M. ACKER CO.
3833 Wilshire Blvd.
Los Angeles 5, Calif.

MULTI-ARC WELDING MOTOR GENERATOR SETS

1,000 & 1,500 AMPS.
GE, WEST., CENT. ELEC. PROD.
Synchronous and Squirrel Cage Drives
Complete with Controls
Write for complete details for these and any other equipment you might desire.
EMPIRE ELECTRIC CO., INC.
DEPT. W
87 Jay Street Brooklyn 1, N. Y.

OXWELD CM-15s, Nat. 5s, Harris K's, Gaso S-24. AIRCO Oxy-graph, Camographs, Radiagraphs. SEAM WELDER, Progressive 150KVA, New. SPOT WELDER, National, 40 KVA for Brass and Stainless.
BRONZE STAINLESS, AMPCOTRODES.
NO. 12 LENSES, ELECTRODE HOLDERS.
RALL SUPPLY CO. 110 E. 42nd St., NYC 17

Stainless Steel Electrodes

3/32— 316-18-8 MO	Rezistal	McKay
Less than 50 lb.	.45	.55
50 to 99 lb.	.40	.50
100 to 499 lb.	.35	.45
500 lbs. or over	.30	.40

KNOLL WELDING SUPPLY
225 Jackson Topeka, Kansas

THE
ARC-FIT
PROCESS
Patented
Tube notched with special ARC-FIT
Angular notch on tubular member.
Square tube notched to fit square pipe.
Angle joint on two pipes.
"T" notch on end of Tubular member.
Pipe Notched with deep slot.
"T" joint on tube or pipe.
Angle Iron notched to fit pipe.

TOPS IN SHOP EFFICIENCY

5 seconds to notch Tubing and Pipe Ends

The answer to many problems confronting large and small shop owners. No shop can afford to be without the ARC-FIT—no matter how large or how small. Manual or power operated—fits the ARC-FIT hand press or any standard power press.

ARC-FIT is a patented precision-built shearing tool which prepares the ends of tubing or pipe to produce welded or brazed tubular "T" or angle joints. ARC-FIT will not deform the tube or pipe and no further finishing is required—no sawing, cutting, or removing sections with milling cutters. Our literature gives many fine points on operation, construction, and application—send for it today —also write for quotations.

VOGEL TOOL & DIE CORPORATION

1825 N. 32ND STREET
Dept. W-E
MELROSE PARK, ILL.

Advertisers In This Issue

This advertisers' index is included as a convenience and is in no way part of the advertising contract. Although every care has been taken to index accurately, some errors may have occurred and no allowance will be made for them.

A

Air Reduction Sales Co. 8-9
Allen Co., L. B. 95
Alloy Rods Company 59
All-State Welding Alloys Co., Inc. 78
Aluminum Co. of America 74
American Brass Co. 10
American Chain & Cable Co., Inc. 55
American Manganese Steel Div. 4
American Optical Company 69
American Platinum Works, The 65
Atlas Welding Accessories Co. 61

B

Bantlan-Blessing Co., The 70
Becker Bros. Carbon Co. 88
Beryllium Corporation 60
Brush Development Co. 53

C

Chicago Boiler Co. 92
Chicago Hardware Foundry Co., The .. 86
Chicago Mfg. & Distributing Co. 81
Cullen-Friestedt Co. 80
Cyc-Arc, Ltd. 82

D

Danly Machine Specialties, Inc. 76
Detroit Stamping Co. 87
Dockson Corp. 85

E

Eutectic Welding Alloys Co. 83, 89

F

Fansteel Metallurgical Corp. 78
Federal Machine & Welder Co. 2
Foster Transformer Co. 64

G

Goldsmith Bros. Smelting & Refining Co. 66

H

Harnischfeger Corp. 47, 71
Harris Calorific Co., The 79
Haynes Stellite Co., Div. of Union Carbide & Carbon Corp. 48
Hobart Bros. Co. 1, 85
Hoffman Co., Robert W. 84

I

Independent Eng. Co., Inc. 86
International Nickel Co., Inc. 73

J

Jackson Products.....Inside Front Cover

K

K-G Welding & Cutting Co. 43

L

Lincoln Electric Co. 14
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp... 67

M

Mallory & Co., P. R. 77
Metal Bond Mfg. Co. 93
Metal & Thermit Corp. 75
Midland Paint & Varnish Co. 92
Miller Electric Mfg. Co. 58
Minnesota Mining & Mfg. Co. 68
Modern Mfg. Co., Inc. 91

N

National Carbide Corp. 80
National Cylinder Gas Co. 12-13
National Welding Equipment Co. 7

P

Page Steel & Wire Division 55
Pierce Governor Co., Inc., The 93

R

Racine Glove Co., Inc. 92
Ransome Machinery Co. 16
Raytheon Mfg. Co. 87
Ruemelin Mfg. Co. 84

S

Sellstrom Mfg. Co. 89
Shawnigan Products Corp. 93
Smith Corp., A. O. .....Back Cover
Smith & Sons Co., G. W. 76
Smith Welding Equipment Co. 72
Square D Company 57
Steel Sales Corp. 88
Stuis-Sickles Co. 83

T

Tweco Products Co....Inside Back Cover

U

Union Carbide & Carbon Corp., Haynes Stellite Division 48
Union Carbide & Carbon Corp., The Linde Air Products Co., Unit.. 67
United States Steel Corp. 81
United States Steel Supply 81
United Wire & Supply Corp. 62

V

Vacu-Blast Co., Inc. 11
Victor Equipment Co. 50
Vogel Tool & Die Corp. 96

W

Welding Alloys Mfg. Co. 92
Weldit, Inc. 91
Westinghouse Electric Corp. 63
Wisconsin Motor Corp. 82
Worthington Pump & Machinery Corp. 16

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT
Positions Vacant 95
Positions Wanted 95
EQUIPMENT
(Used or Surplus New)
For Sale 95

STOP WELDER LOSSES with TWECO CABLE Connections

A single electrode holder thrown away is no great loss in itself, but when production and man-hours as well as a great many unnecessary replacements are involved, profits take a licking every time. Switch to TWECOTONG, the electrode holder with super-service insulation that is replaceable at small cost without discarding the entire holder.

TWECOTONG TIP INSULATION
Defies Heat and Impact

TWECOTONG "Super-Mel" tip insulators are made from multi-layer glass cloth in patented tubular-keyed design. This assures a tight fit on TWECOTONG'S rugged copper alloy jaws to withstand great impact. Their melamine resin binder and exclusive TWECO construction resist heat, shock, and arc-burn more effectively than other holder insulations on the market. TWECOTONG is turning in a superior performance on all classes of work. It is especially recommended for high heat and severe service conditions.

The same TWECOTONG tip insulator fits both the top and bottom jaws on all models except A-532. A minimum TWECOTONG holder stock and a modest investment in long lasting tip insulators is all you need to maintain top holder efficiency in your shop. Buy TWECOTONG!

TWECOTONG SINGLE UNIT PRICE — WRITE FOR QUANTITY PRICES THEY SAVE YOU 10 TO 27%

Model A-38	Model A-14	Model A-316	Model A-532
500 AMPS for 3/8-3/32" rod	300 AMPS for 1/4-1/16" rod	250 AMPS for 3/16-1/16" rod	300 AMPS for 5/32-1/16" rod
$6.50	$5.00	$4.75	$4.50

All TWECOTONG models are standard equipped with heavy duty "Super-Mel" tip insulation.

Write for Twecolog No. 8 giving data and prices on the complete TWECO line of electrode holders, ground clamps and cable connections for electric welding.

Tweco PRODUCTS COMPANY

MANUFACTURERS OF ELECTRODE HOLDERS • GROUND CLAMPS • CABLE CONNECTIONS FOR ELECTRIC WELDING

BOSTON AT MOSLEY • WICHITA 1, KANSAS

SEE YOUR WELDING SUPPLY DISTRIBUTOR

4,000,000 POUNDS OF WELD METAL...

No shutdown in 2 years!

In two years' continuous operation on a three-shift basis, these 116 A.O. Smith Heavy Duty AC Welding Machines on this auto frame line have set an amazing record of *dependability in production.* Designed and built for extreme requirements, they have accumulated nearly 15,000 hours per machine—a rugged *in-service* life-test at duty cycles up to 82%!

More than 1,000,000 auto frames were built in this period . . . more than 4,000,000 pounds of weld metal deposited by the Welding Machines shown here—*without a shutdown* caused by welding equipment failure!

The A. O. Smith Heavy Duty AC Welding Machine has *proved in use* that it will stand up under service which punishes most welding machines. We rely on it to turn out thousands of tough welding jobs—from truck frames to giant pressure vessels.

And you can rely on it for long, trouble-free service, power savings, easy operator acceptance. But *you* be the judge . . . try the welder MADE *BY* WELDERS *FOR* WELDERS.

WRITE, WIRE or PHONE for the name of your nearest distributor.

made By welders
...For welders!

A.O.Smith

WELDING PRODUCTS

P.O. Box 584, Milwaukee, Wisconsin

A. O. Smith CERTIFIED Welding Electrodes
—the standard of dependability since World War I